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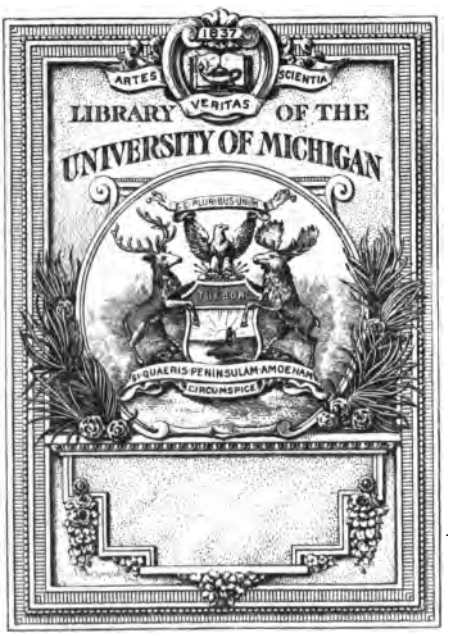

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EPIDEMIOLOGICAL SOCIETY.

ON AN ANOMALOUS EXANTHEM: ROSALIA IDIOPATHICA.

By B. W. RICHARDSON, M.A., M.D.,

[*Read* 3 *November*, 1862.]

In bringing this paper before the Society, I am anxious to take the opinion of the members on one special question, viz., Whether it is not time for the profession to try to come to some decisive conclusion respecting the definition of certain exanthematous eruptions, which at the present moment lie out of all known and acknowledged systems of classification?

In practice, we are constantly being called to see forms of disease, occurring sometimes in the adult, but more frequently in the young, in which we recognise an exanthem of the nature of which we have no defined knowledge. We trace the disorder to no contagion, and yet to our minds we see something about it which we call "suspicious." The parents or relatives ask us pressingly:—Is there any danger of infection? We reply that the point is undecided; that the disorder does not seem to have had a contagious origin, and therefore it is probable that, in its turn, it is not a contagious malady: but if we are considerate men, and honest men, we admit, at the same time, the scantiness of our knowledge, and we guard our hopeful prognosis by recommending that the safe side be taken; that if any susceptible persons, especially children, be present, they be kept away from the sick, or be removed altogether to a distance; and that certain hygienic or preventive measures be afterwards followed up, which shall destroy even the fear of extension.

It happens often that our cautious advice is followed, and that the extension of the disease, as an assumed spreading disease, is apparently stopped at the onset. We are satisfied

with the result then, even though the measures we have suggested may, in our own minds, have been rather prudentially negative, than obviously affirmative. But occasionally we get a different train of events. We order the separation, but circumstances prevent the carrying out of the command; the sick child or person remains in the companionship of the healthy and no infection follows. Again, and on the opposite side, the symptoms in a first case may be so doubtful and so slight, that we think it unnecessary to press removal or separation; but thereupon infection follows, and we are criticised for not foreseeing the worst at once, or for not providing against it. I have written in the above passages, experiences so commonly felt by members of the medical body, that I ought almost to apologise to them for the unrolling of a picture with which they are so intimately and painfully familiar. But it was, I felt, the best method of making the question forcible, to place it on an obvious basis, in a form simple and didactic.

In considering the anomalous exanthem to which I wish to ask attention, we may narrow the subject greatly by reducing the difficulties offered to their legitimate boundaries. There are two diseases in respect to which our observations are chiefly bound — measles and scarlet fever. Nay, in the majority of cases, we may consider that the last-named disorder is the disease that gives us real anxiety. To the anomalous eruptions which may be confounded with this affection, I have already twice directed the notice of the Society, but a wider experience having increased rather than removed my difficulties, I refer once again to the matter in its entirety.

I give, in illustration, the following few examples. I have, in all, twenty-five illustrations, but the careful narration of three, or at most four, typical examples will answer every purpose.

A young woman was seized with slight shiverings, sensations of chilliness, weight in the head, and thirst. These symptoms lasted for a period of twelve hours, when the body became covered with a red rash very bright in colour; the throat became sore, and the tongue loaded and white. She was kept in her bed, and a simple effervescing saline was ordered. Twelve hours after the first appearance of the eruption, it had entirely disappeared, and the patient expressed herself as feeling quite well, in fact, she resumed her work, as servant at an inn. Three weeks afterwards the same symptoms returned and passed off as favourably as

before, leaving no secondary disease. The disease was communicated to no one else, although so large a number of susceptible persons were exposed, that, had a contagious product been present, all, I think, could not have escaped.

A young married woman, who was placed in very unfortunate circumstances, her room being imperfectly lighted, and her dwelling being situated in a low and dirty locality, was seized with febrile symptoms, followed by universal red eruption of the skin and soreness of the throat. The eruption, in this case, faded, and the soreness of the throat subsided with signs of sudden and great prostration, followed by severe griping pain in the bowels and copious purgation. With this derivation the recovery seemed to be immediately connected, for there was no return of symptoms and no sequelæ. The woman being weakly, recovered slowly, but she communicated the disease to no one, although two susceptible children slept in the same bed with her, and an infant was at her breast.

In November last year (1861) I was called to see a young lady, nine years of age, who was seized with the symptoms of common cold. Owing to special circumstances of a domestic kind, this child had not left the house for three weeks before this illness, nor had anyone been to the house who could possibly be suspected of conveying contagion. The circumstances, indeed, altogether were such that, in no case, could the idea of spontaneity of disease be more justly inferred. When I arrived, I found the child covered with a red rash, identical with that of scarlet fever; the rash was universal, there were no blotches connected with it, no raising of the cuticle, no roughness. The throat was red and very sore, the tongue was of the strawberry character. I think there is not a practitioner living who would not have pronounced the disease to be scarlatina. There was another child in the same house, a little boy, her brother, and the two children, neither of whom had before had the disease, had slept together in the same bed on the preceding night. It was not practicable to separate these children, and I consequently expected an extension of the malady; but all the future of that case was anomalous, On the second day the eruption had disappeared altogether, the throat remaining injected; on the third day the throat had lost all its redness, but now again the skin was universally re-covered with the eruption; the next day both throat and skin were clear, and the child seemed well; next day there was sudden and severe return of the exanthem, with fever; next day clearness; and so on

alternately, for some days, these events recurred, the eruption gradually becoming less marked. At last the attacks ceased, and recovery was complete. There were here none of the sequelæ of scarlet fever, nor was there any extension of disorder to the second child. Whether the disease was true scarlatina or not, I leave for after discussion.

I will trouble the Society with only one other case; it is the most important of all I have named, for it terminated fatally.

A gentleman, twenty-three years of age, who suffered from extensive disease of the heart, and from frequent attacks of severe and imminent cardiac apnœa, was in his usual health on Thursday the 4th of September. On the evening of that day, very late, after amusing himself heartily, he complained of slight shivering; he had had frequent attacks of subacute rheumatism, and in my opinion there was now a tendency to a return of one of these attacks. There was no reason to suppose that he had been exposed to contagion, and the thought of such an exposure did not for a moment occur to any one. At my suggestion he retired to bed. At nine on the following morning he sent for me. He reported that he had been rather restless, and both in the night and in the morning had waked with a rigor, with great nausea, followed by actual vomiting, and with much soreness of the throat. I found him with a flushed face, his eyes bloodshot and suffused with tears, his mind anxious, his throat intensely red and injected, and his head and loins in pain. On his body, at that time, there was no eruption. I prescribed for him a simple saline and a gentle purgative. His stomach, however, was too irritable to retain much of the medicine, although he did retain sufficient of the aperient to have from it one or two free and healthy evacuations. In the course of the day, a faint eruption of a purplish red colour appeared on the chest, and gradually spread over the whole of the body. On Friday the body was covered universally with the rash, the throat was very sore, the irritability of the stomach was great, and the mind disturbed. He passed through the day without much change, and in the evening was easier, but had an objection to take any food or drink because of the soreness of the throat. In the night he was seized with hiccough, which was continued in spite of every sedative and every external counter-irritant without any abatement, and I may say almost without a remission for sixty-five hours; it even continued during sleep. The symptoms having now assumed a serious type, I telegraphed

for my friend Mr. Daniell, of Newport Pagnell, who had attended this gentleman for some years, and who was the family attendant. On his arrival Mr. Daniell concurred with me that, taking it all in all, the case was probably one of scarlet fever, but he held, as I had done, that the evidences were not clear. On the following morning, after a very bad night, the eruption assumed a new character. On the extremities, intermixed with the red exanthem, there were numerous white well-defined blotches of variable shape, giving to the skin in these parts a peculiar mottled appearance; at the same time there was no itching nor indication of cutaneous irritability. We had now the able and kind assistance of Dr. Murchison, who thought that the eruption was rather like that of urticaria than of scarlet fever, and who took a more hopeful view of the case than I had done.

In the course of the day, the symptoms remained little changed; there was still hiccup occasionally, vomiting, and an extension of the white patches on the extremities. At night the lower limbs were so marked by the patches, that the surface on the skin resembled a deep red colouring interspersed with frozen spots, some as large as a five-shilling piece, others of the size of a sixpence with intervening gradations. There was no raising at these spots, no roughness, no hardness, no marked difference in temperature. In the night there was superadded delirium, sometimes low and muttering, then wild and furious. The next day, Wednesday, these conditions continued; the tongue was brown and chapped; the throat at the back white, as if from a soft sloughing patch, like one of the patches on the skin; the pulse jerking; the hiccup continuous, but with less force. In the afternoon of Wednesday, the left foot altogether was of deathly paleness, a line of demarcation marking it out above the ankle: this state continued for some hours, with some coldness of that foot, followed by sudden change in the way of intense reaction and vehement, almost erysipelatous redness. Our excellent Secretary, Mr. Radcliffe, saw the patient at this juncture, and examined the foot carefully: in the course of the night, which threatened to be the last, this reaction subsided, and the foot resumed a mottled appearance, like the other parts of the extremities. Our patient passed through Thursday scarcely living, but in the evening rallied and took more nourishment, and was inclined for sleep; he slept for six hours calmly, and then asked for food. On Friday he appeared to have survived the attack, he became quite conscious, took food well, and I hoped had

made the turn in the right direction; but at midnight he woke from a calm sleep with stridulous breathing and croupy cough, attended with a profuse secretion of tenacious mucus from the windpipe or larynx. He was now threatened with apnœa from laryngeal obstruction, and I called in my friend Mr. Henry Smith, to consider the propriety of performing tracheotomy. Mr. Smith opined that the obstruction was not sufficiently urgent to warrant the operation, unless a severe paroxysm threatened suffocation. We watched him together through the day and each hour with increasing reason for hope. Our expectations were not realised: in the afternoon of Saturday, the circulation suddenly became tremulous, and our patient for the first time in the course of his illness was seized with one of those severe attacks of cardiac apnœa with which he had often been visited before. After a severe struggle he rallied, but the attacks returned and returned; at last one occurred in which, with the cardiac hesitation, the larynx seemed to be spasmodically closed. *In extremis,* I opened the trachea, and air at once refilled the chest; but it was of no avail, for the heart came to a final cessation as though it had emptied its column of blood into the general circuit, and had contracted on itself.

We found after death that there was very extensive disease of the heart; the right side was empty, its cavity largely dilated, and the walls exceedingly thin; the left side was also empty, the walls thin, and the aortic valve thickened in one of its segments. The lungs were congested but inflated; the kidneys and spleen were of enormous size; the stomach and intestines were healthy.

Turning to the throat, we found an extensive ulcerated patch in the posterior part of the pharynx, and anteriorly in the pharynx, and at the posterior part of the larynx, beneath the muscular structure, was a small abscess, containing about a fluid drachm of pus; there was also œdema of the glottis on one side, but the opening into the glottis was free.

Two facts should be added to this history: one, that the father of our patient, who throughout had attended his son with wonderful endurance and fortitude, became, on the day following the death, affected with a low febrile attack, accompanied with great œdema and diffuse inflammation of the tonsils and uvula, from which he recovered after severe and most dangerous symptoms: and, that the gentleman who made the *post mortem,* having accidentally pricked himself during the performance of his duty, was seized with low fever, and was covered over the skin with a scarlet rash.

There was not, however, any other indication of the spread of infection.

I have spoken so far of individual cases of disease only. I might, if time were allowed, speak of an epidemic of an anomalous kind which occurred in the south midland counties two years ago, and which greatly perplexed the practitioners there. Mr. Daniell of Newport Pagnell had eighteen or twenty cases of this disorder, and he tells me that he has no name to give to it. It commenced always with suffusion of the eyes, as if from measles, followed by an eruption and other symptoms which were identical with the symptoms of scarlet fever. "I should call the epidemic," he says, in his own words, "a mixture of measles and of scarlet fever." The epidemic appeared to be contagious in its character.

Propositions.

In considering the disease I have specially described, we must assign to it one of these positions.

1. It is a disease holding place between measles and scarlet fever, simulating both, but distinct of itself.

2. Or, it is a disease compounded of the two diseases, measles and scarlet fever.

3. Or, it is an imperfectly recognized form of scarlet fever.

4. Or, it is another disease, simulating scarlet fever, but distinct from it.

As regards the first of these propositions, I am inclined to discard it. I do not believe that between scarlet fever and measles there is any specific spreading communicable disease that remains unrecognised. I think there are too many observers, and that observations have been conducted for too long a time, to allow of such an omission in diagnosis. At the same time, when I was tabulating the histories of epidemics in the *Sanitary Review*, I did repeatedly receive carefully written accounts of spurious epidemics, which appeared to be due to some particular poison, and which did not tally with any of our classical formulæ of disease. I regret much that circumstances connected with the expenses involved, prevented me from continuing these great inquiries.

I discard also the second of the propositions noted. I do not believe that there is ever an amalgamation of the two diseases measles and scarlet fever. I have seen a child during convalescence from scarlet fever take measles, but the second disorder was perfectly distinct and readable. Added to which, in all the cases I have named and all I have seen, certain distinctive characteristics of measles were absent, to wit, bronchial affection and nasal catarrh; while there was in

every case a tendency to affection of the throat, which is not pathognomonic of measles, but is strictly pathognomonic of scarlet fever. Indeed, if I were to describe, from the structures affected, a distinction between these two disorders, I should say that measles was essentially a disease involving the skin and respiratory mucous membrane; and that scarlet fever was essentially a disease involving the skin and gastro-intestinal mucous membrane. In the cases under discussion the disorder is one which, in every case, appears to have its visible seats in the skin and gastro-intestinal membranes.

Is there a modification of the ordinary disease scarlet fever which is not yet fully recognised and defined? Was that a case of true scarlet fever which I described as ending fatally? The peculiarity of the eruption in that instance, —Was it a specific eruption, or was it a scarlet fever eruption modified by some peculiarities of the individual? If the eruption had been entirely new, I should have accepted the last interpretation; but, on combining reading with observation, I find that a similar condition has been observed and formularised. In describing scarlet fever, Dr. Mason Good, under the head "*Rosalia Paristhmitica*", gives the following perfect definition:—

"In the second or Paristhmitic variety, the morbid virus is chiefly directed to the fauces, instead of to the surface of the skin generally. And hence, in some cases, the cutaneous efflorescence is very slight, and consists of a few scattered patches of flush instead of a diffused sheet. The rash, moreover, appears later by a day or two, sometimes even a week; probably delayed by the same cause that interferes with its general spread over the skin, being the local irritation about the throat. This last symptom will be found to commence very early if the throat be minutely inspected; for though no complaint is usually made of uneasiness in the throat previous to the febrile symptoms, yet, if it be closely examined, the velum pendulum palati will be found redder than natural, and sometimes the uvula will appear to be a little inflamed, the pulse being at this time not more than slightly disturbed, or flurried rather than feverish. Dr. Willan asserts, that this takes place as one of the first effects of the contagion, and describes it as 'a dark-red line extending along the velum pendulum palati and lower part of the uvula.' Gradually, however, the tonsils become enlarged, and exhibit a florid paleness on their surface, which extends over the whole range of the palate, its velum pendulum, the uvula, and the posterior part of the fauces; the tongue assumes a high red colour, the papillæ over its entire surface

are greatly elongated, and very tender to the touch; there is often a considerable stiffness in the muscles of the neck and lower jaw; the throat is rough and straightened from the second day of the eruption; and deglutition is performed with difficulty.

"All the common symptoms are more violent; the fever is severer, accompanied with nausea, vomiting of bile, great heat, and languor; considerable inquietude and anxiety, head-ache, and delirium; evidently proving a copious determination to the head as well as to the fauces. The pulse is feeble, the respiration quick; the throat becomes excoriated and throws off a large quantity of minute superficial whitish sloughs, which intermix with the increased flow of viscid mucus, and augment the difficulty of swallowing. The sloughs generally separate about the fifth or sixth day, or at the decline of the efflorescence; but sometimes they remain a day or two longer.

"This is the ordinary course; but, in many cases, the symptoms run still higher; and the disease is alarmingly dangerous from its irruption. The pulse is small, indistinct, and irregular from the first; there is a stupid, heavy coma, or violent delirium with deafness; the ulcerations in the throat are deeper and broader, and covered with dark instead of with whitish sloughs; the tongue is lined with a black, chappy crust, and is exquisitely tender; the breath is fetid; the rash, extensive from the commencement, assumes a livid hue *with intermixed patches of ghastly paleness;* and death ensues shortly after the seventh day, sometimes on the sixth."

This entire and perfect recognition of the disorder, as observed in our patient, necessarily renders it obvious that the peculiarities described did not pertain exclusively to the condition of the patient; while the fact of that description, under the head scarlet fever, by one of our very greatest nosological authorities, might warrant us in continuing to designate the disorder as scarlet fever; but, as I shall ultimately shew, I am prepared to modify this view, new observations tending I think to warrant a change of diagnosis.

Is there another disease which may simulate scarlet fever, but which by its symptoms admits of being mistaken for scarlet fever? In this question a very important subject is embraced.

I have shewn in another place* that the poison which gives

* Æsclepiad. Clinical Essays. Essay on Scarlet Fever. Lond.: Churchill, 1862.

rise to the symptoms of scarlet fever is probably analogous to the active poison of acute rheumatism. Can rheumatism assume an eruptive character? In some of my cases a strong rheumatic tendency was present, but I cannot say more, because I have no sufficient facts to guide me.

Dr. Ross, who, like myself, has been labouring long to investigate this problem, in his last admirable address to students, has thrown out a suggestion of great weight. He believes that "urticaria" is the disorder by which we are misled: I will quote his words in full. He says—"Again I have observed, season after season, epidemics of a disease called commonly scarlatina, and passing current in the profession itself under that name, which for twenty years at least I have been accustomed to distinguish as a different disease—a species of urticaria. These are regarded sometimes as mild cases of scarlatina, sometimes as measles, and sometimes, too, as measles and scarlet fever concurrent; for such examples I have frequently seen reported in the medical journals. The instances of second attacks of scarlatina and measles are generally attributable to this mistake in diagnosis."

Respecting this last view, I have only to say that in none of my cases was there any of the special characteristics of urticaria, such as great irritation of the skin, or raised surface in wheels, or true *nettle* rash.

Summary.

In resumé, I look upon the disorder as a distinct affection, having the following characteristics.

It is not contagious (the poison being fixed in character), except by direct inoculation.

It shews no tendency to produce disease of kidney or uræmia. This was the fact in all my cases.

Unlike scarlatina and measles, it is variable in its course: it may terminate at once by active purging or vomiting, by which offending matter is removed from the alimentary canal; it may continue until it terminates in death.

It is probably excited, in the stomach, by the irregular digestion of some particular forms of food, which yield in the digestive process products of the fixed organic acid type, which products are absorbed from the canal into the blood.

From the disease not being contagious, and from the fact that it arises in the body from previous malassimilation, I have named it Rosalia Idiopathica.

ON CERTAIN ENDEMIC CUTANEOUS AFFECTIONS OBSERVED IN SCHOOLS, FACTORIES, AND WORKHOUSES.

By THOMAS HUNT, Esq., F.R.C.S.

[*Read February* 2, 1863.]

Among the many advantages of the cultivation of sanitary science by which this age and country is distinguished, may be mentioned the insight it has given us into the unsuspected causes of several diseases not previously supposed to be affected by sanitary influences. My attention was first awakened to this subject by discovering that several of the chronic diseases of the skin, of obscure origin, were certainly affected by epidemic causes. Not only are chilblains prevalent in cold weather, papular diseases in the spring, and pustular in the autumn; but there are years or parts of years, irrespective of season, in which one form of disease is for a time so exceedingly common, and another equally so at another time, that is impossible to regard the phenomena as unaffected by some epidemic cause. Even different parts of the body come in for a share of this. Sometimes *diseases of the scalp and face* prevail most unusually; at another time *scabies* (which affects every part *except* the face and scalp) is most decidedly epidemic. At another season the *waist* is affected, and the cases of herpes zoster, or shingles, which occur in three months, will be as numerous as they generally are in three years. Then there will be an unaccountable number of patients afflicted with eczema, boils, pustules, or ulcerated rupia; and at other times very few. Much of this *may* be accidental. Yet the facts are too numerous and too marked to admit of this solution being applicable to the whole.

But if it be true that epidemic influences operate in the promotion and spread of skin diseases, it is still more conspicuously evident that some of these diseases are greatly under the control of *endemic, i. e.* of local, influence. Rupia and ecthyma, neither of them contagious, will frequently enter a confined London court or alley, and affect almost all the inhabitants under the middle age, at one and the same

time. But what I wish prominently to bring forward at this time is, the effects of congregating and incarcerating many children or young persons under one roof and feeding them on one and the same diet; thus promoting locally the more or less permanent inroads of certain cutaneous diseases; which diseases often subside spontaneously, upon the removal of the sufferer from the locality. These diseases are chiefly the common ringworm (*porrigo scutulata*) and scabies; the former being usually aggravated by the presence of a vegetable, the latter by an animal parasite. I have never visited a workhouse or a detachment of pauper children, or a large boarding school occupied by the poor, without observing many cases of ringworm and scabies; one of these two diseases prevailing at one time, the other at another period, and both showing a tendency to pustulation. These cutaneous plagues will often persist month after month, in spite of the most careful treatment and the most scrupulous attention to cleanliness and ventilation. I have already published an account of an endemic scabies, which infected, for many months together, a large girls' school in the neighbourhood of London, where cleanliness, ventilation, good drainage, good nursing, and good medical care were conspicuously apparent; but nothing was of any permanent service until an entire change of diet was introduced, together with the daily exercise of the inmates away from the premises.

Accounts of similar endemic difficulties reached me from medical practitioners, who had the charge of institutions of the same character in different parts of the country; and the same kind of treatment proved equally effectual in all of them. In those factories where children are employed, and *boarded* and *lodged* on the premises, like occurrences are observed, involving the clean and the dirty, the well-fed and the ill-fed. The doctrine of contagion fails to explain the cause; nor, indeed, is any one imaginable cause to be named that is capable, *per se*, of accounting for all the peculiarities of the case. But it appears to me that, by duly reflecting upon *all* the sanitary circumstances in which these children are placed, we may be able to discover an aggregate of influences, so to speak, which, not separately, but concurrently, may combine to produce these morbid conditions. Atmospheric impurity, unnatural diet, deficient exercise, and contagion, are the four conditions which appear to me to unite their several forces to perpetuate these loathsome affections of the skin. And yet not one of these causes alone

ever presents a formidable difficulty in the treatment; neither does either of them exist in any prominent degree in these establishments. There is no sensible vitiation of the atmosphere, no bad smell, no defective drainage, no neglect of ventilation. The diet is excellent in quality, plentiful in quantity, wholesome in character, and correct in its chemical elements. Exercise is allowed and encouraged within the walls of the institution; and contagion is for the most part antagonised by care and cleanliness, and often by individual segregation. So that, considered apart, these causes of disease exist, if at all, in scarcely an appreciable degree. And yet, together they are capable of establishing a most formidable cachexia. They poison the blood, producing not only their immediate effects in the form of parasitic skin disease, but laying the foundation, probably, of more serious disorders, manifested in after life by the presence of lumbrici, ascarides, tape-worm, pediculi, fungi, hydatids, tubercles, and perhaps cancerous germs in the various organisms, which, under morbid changes, become capable respectively of nourishing these distinctive parasites. But to examine these causes *singly*.

1. The *atmospheric impurity* may not be prominently appreciable. But the air contained within the four high walls which bound the premises, receiving the breath of hundreds of persons day and night, tainted by their excretions, and seldom or never wholly changed by a full blast of air from without, probably contains a peculiar poison, and this poison may be aggravated by the sameness of diet, and consequent sameness of secretion and excretion from the whole group. The poison is much diluted; but it is always, night and day, entering the lungs of the same persons, and finding an exit as constantly. If this air could be exchanged for *worse*, derived from extraneous sources, the change would probably be beneficial; but here the system must always be eliminating one and the same poison, or else succumb to its influence.

The human body, fortified as it is against the noxious influences of a thousand evils from without, seems less protected against the incessant battering of one destructive agent. In such a state of things as this, *change is salvation, sameness is disease or death.* So, in like manner, while the whole body will bear exposure to extreme heat or cold, the continual and unvarying application of either to one part only of the body will prove injurious, even though the temperature be moderate. We can breast a gale of wind in an open boat without danger or inconvenience; but a constant

unvarying draught of cool air from a crevice or a keyhole suggests thoughts of rheumatism, catarrh, pneumonia, quinsey, ophthalmia, toothache, and deafness. So we may breathe a thousand poisons by turns, and for a short period each, and none shall hurt us; yet the weakest among them may harm us seriously if continually respired.

2. But if a sameness of atmosphere is injurious when it is not pure, much more so is *sameness of diet;* an evil which attaches to most institutions of this kind. There is a daily dole of potatoes with boiled mutton, or potatoes without boiled mutton: there is the eternal pea-soup or oatmeal-gruel, with so many ounces of bread and so many grains of salt. Oh, what a luxury would a red herring be to those poor creatures, or a lettuce, or an apple, or a dish of greens or carrots or turnips! Man was made capable of living upon a variety of food, animal and vegetable, fish, flesh, fowl, root, leaf, stem, fruit, and seed. But no man can live on bread alone; no, nor on mutton chops alone, nor on any two or three articles alone. The life supported by half a dozen changes only, is a feeble, imperfect, half-poisoned condition. There is a story of a landlady of a public-house in a country town, where a party of soldiers were billeted for a week. She provided hot mutton pie for the first day. The men ate heartily, and praised her cookery. She provided hot mutton pie the second day. The men could dine on it, but ate very moderately. On the third day they complained bitterly, mutton pie again! The sight of it on the fourth day was enough; sameness had become poisonous, and nature refused to submit. Before the end of the week the soldiers' keep was found to cost but little. The story is true to nature, as every one knows; but every one does not know that the itch may sometimes be cured by turnips. And a certain member of the committee of one of these schools referred to, declared that he was not going to believe it. But the girls got their turnips, and the itch got well.

3. *Deficient exercise* in these cases has a threefold influence for evil. *First,* so long as children are confined within walls, even although a playground be provided, there is less to induce exertion, especially in the indolent, than when a run in the field is allowed. Consequently there will be insufficient perspiration, and the blood suffers through this suppression. *Secondly,* the want of muscular exertion causes a redundance of fat, or worse evils; and *Thirdly,* exercise in the open air, and plenty of it, is the only way in which children can get perfectly pure air into the lungs, as well as

the only way of avoiding that sameness of atmosphere which tends to deteriorate the blood.

4. *Contagion* finds ready victims in the weak and unhealthy. The sporules of the fungi, which are often found in the scalp affected with ringworm, are floating in the atmosphere seeking for a nidus or soil. In the more vigorous they produce no effect. In the weakly, and especially in those in whom the disease is already established, they take root and fructify, and prevent the recovery of the patient. Change of air and exercise combine to restore the vigour of the circulation, and the returning tide of health destroys the parasite, which can no longer live without an appropriate soil. And this explains why every topical application fails to cure the disease. Each and every one fails to restore the general health.

The case is much the same in scabies. It is my belief that the acarus does not constitute the disease, although it may communicate it; but it aggravates it exceedingly, and the parasite breeds incredibly fast when supplied with its own peculiar food—dirt and vitiated structure. Remove the dirt and restore the healthy tone of the skin, and the parasite dies in time, whether poisoned by sulphur or not. Death and extinction follow starvation as certainly as they follow poison.

It appears, then, that these four causes, atmospheric impurity, sameness of diet, insufficient exercise, and contagion, all of them trifling in degree, are yet capable of working together for evil, and may thus become powerful agents in the promotion and perpetuation of disease. The blood becomes vitiated from the unvarying character of the diet, from impure and stagnant air, from deficient perspiration, and restricted activity of limb; and the agents of contagion triumph over the low degree of vitality which results.

If this be sound pathology, these combined evils will probably be found to play a busy part in the production or aggravation of other diseases, endemic or epidemic in their character. Fortified by an ample, generous, and varied diet, free ventilation, active exercise, and cleanly habits, our junior population might set at defiance cholera, diphtheria, dysentery, and typhus, and probably half the physical "ills which flesh is heir to".

One word, in conclusion, on the mode in which this peculiar animal poison is generated. It is now an established fact, that the effete materials of a man's own body constitute to him the most energetic of all animal poisons. If either

the bowels, or the kidneys, or the skin, or the lungs refuse to perform their office, death results—in a few days if the bowels act not, in less time if the skin is entirely inactive, in a few hours if the kidneys fail, and in a few minutes if the lungs cease to decarbonise the blood. Next in toxical intensity to a man's own excretory products, are the excreta of other individuals, *feeding on the same food and breathing the same air* as himself. The cases of cholera occurring on ship-board are for this reason more intense than others; and, next to these, the cases occurring in the undrained houses of laundresses, where the excreta of the household and the soap-suds of the wash-tub are all received into one common cesspool, which taints the atmosphere of the whole house. I venture to designate this as a special animal poison, which, though it does not destroy life, yet prepares the system for disease and death, by exposing it to the power of destructive agents, which, under other circumstances, would be harmless and innocuous.

ON RECENT TYPHUS IN LANCASHIRE.

BY GEORGE BUCHANAN, M.D.,

PHYSICIAN TO THE LONDON FEVER HOSPITAL; ONE OF THE MEDICAL INSPECTORS FOR THE PRIVY COUNCIL.

(*Read February 2nd*, 1863.)

I PROPOSE to give a short account of the typhus fever that has been seen in the cotton districts of Lancashire since the commencement of the present distress. Since the great typhus epidemic in Lancashire at the time of the Irish famine, in 1847-48, there has been scarcely any of this disease in the cotton towns. Liverpool, indeed, resembles London, and has formerly exceeded London, in its disposition to epidemics of typhus; but in the cotton towns proper all the medical men who best knew typhus, through their experience of the epidemic of 1847, assured me that this disease had been absent for many years. It appeared probable, indeed, that stray cases had been seen from time to time in Manchester, and, considering the freedom of intercourse between this city and other parts of the kingdom, it would be strange if some cases were not imported.

In 1862, however, positive maculated typhus made its appearance afresh. The disease has been most prevalent at Preston, and next at Manchester. Numerous cases have been met at Accrington, and also several at Chorley, a town not far from Preston; and scattered attacks, still of true typhus, appear to have been observed at Salford and Blackburn.

As the chief interest centres on Manchester and Preston, I shall not make any comments on the smaller outbreaks.

I visited Preston first on the 29th of October, and found in the House of Recovery (the parish fever hospital) fifty-two cases of *bonâ fide* typhus. In all the patients who were in the stage of the disease for a rash to exist, the characteristic mulberry rash was present. In intensity, the fever appeared pretty identical with the same disease as it is seen in the London Fever Hospital.

The earliest case of distinct typhus which I could trace had occurred on July 7th, in a four-roomed cottage (17,

Castle Street), at some distance from the centre of the town. It was not known that the first patient had been exposed to contagion. In this cottage eight persons had crowded by night into a room the utmost capacity of which was eight hundred cubic feet. They were dirty and underfed, and the boy who first fell ill had also been much exposed to the weather. This boy was removed to hospital, and returned home on his convalescence. In the last week of August, six other persons were attacked in this house: they were removed, and the house was closed. Meanwhile, new cases of typhus had occurred in another part of the town, apparently without communication with the former. These were in a district that was afterwards subjected to the chief violence of the epidemic—some very confined and dirty courts, lying low, near the canal, and densely inhabited. The first case in this quarter was on July 28th, in a man who had recently come to lodge there; and after his removal, no one else was attacked in that house. On August 11th, a young woman was attacked at 23, Foster Square, in an adjacent court; and her friends not only refused to let her be removed, but five or six of them continued to occupy the same room and bed with her. Hence, on September 27th, three others of the family came under treatment for the fever, and were sent to hospital. From this family numerous other cases of typhus were traced. At the end of August, a third neighbourhood, distant from either of the other two, became affected with typhus, cases occurring at short intervals in two common lodging-houses not far from each other. In one of them (53, Leeming Street) six persons were successively attacked during September, being always removed to hospital. A fourth outbreak, apparently unconnected with the rest, was seen in another central part of the town in the middle of September. At 10, Green Street, a woman was found extremely ill of typhus, and both she and her husband died in the hospital. In some crowded dirty courts adjoining numerous cases of fever afterwards occurred. By the end of September, cases of typhus had occurred in five out of the six wards into which the town is divided.

On September 5th an old man was admitted into the work-house suffering from severe typhus. He was found to be so weak that the medical officer was afraid to have him removed into the parish hospital, whither by rights he should have been sent in the first instance. He died on the 7th. On September 13th, 15th, and 21st respectively, three inmates of the work-house were attacked with fever and removed to

hospital. The characters of typhus were not well marked in these; but on the 29th, three other inmates were found to have undoubted typhus: they were removed to hospital, and in a week two of them were dead. On the 30th, another was removed, and she also died. On the 2nd October, three others were taken from the work-house, and of them one died in the hospital. During the first half of October six other cases of typhus appeared, and were promptly removed, none of these proving fatal. No other inmate was attacked with typhus, till the last days of October, when two more were removed, and one of them died.

During October the fever extended more widely over the town, not only maintaining its ground in the districts first attacked, but also affecting distant streets, and often one or two houses only in them. The total number of cases of true typhus, excluding typhoid and febricula, with the dates when they were first seen, was ascertained from the medical officers. Subjoined is a summary of the new cases up to Nov. 1st, with their mortality up to Nov. 18th:—

Cases of Typhus occurring in the—		New Cases.		Deaths among these new Cases.	
Month ending July 31	—	2	—	0	
„ Aug. 30	—	8	—	0	
Week ending Sept. 6	3	—	1		
„ 13	1	—	0		
„ 20	4	—	1		
„ 27	15	—	4		
(Four weeks)		—23			—6
Week ending Oct. 4	22	—	6		
„ 11	14	—	3		
„ 18	25	—	2		
„ 25	22	—	3		
„ Nov. 1	26	—	6		
(Five weeks)		—109			—20

The further progress of the typhus epidemic, ascertained from the returns of public practice in Preston, has been:—

Week ending Nov. 8	18	new cases.
„ 15	26	„
„ 22	22	„
„ 29	23	„
In four weeks	—98	
Week ending Dec. 6	16	new cases.
„ 13	8	„
„ 20	6	„
„ 27	8	„
In four weeks	—38	
Week ending Jan. 3	13	new cases.
„ 10	15	„

And since then it is believed that there has been again a

slight fall in the numbers. I believe there has been no further outbreak in the work-house.

The mortality of typhus in Preston up to the end of November, excluding those then under treatment, was 23 per cent. of the cases. In the house of Recovery the mortality was lower, somewhat under 18 per cent.

At the time of my visit at the end of October, the House of Recovery, which was constructed for forty patients, contained fifty-two cases of typhus, and afterwards there were upwards of sixty inmates at one time. In some wards the space for each bed fell short of 600 cubic feet, and the air was here very foul. At the beginning of November a wooden building was erected in contiguity to the House, capable of containing sixty patients, with a space of 1500 cubic feet to each. This building was put up in ten days, but there was a lamentable delay before the patients were removed into it at the end of December. In the meanwhile upwards of twenty persons in attendance on the sick had caught the fever, the medical officer and the master of the House of Recovery being among the number.

The occupations of the persons attacked by typhus in Preston was only ascertained in the case of forty of those who died before the end of November. Of these, fifteen were cotton-workers, or their relations, nine were "labourers," four were engaged in various departments of iron-work, six were artizans unconnected with the foregoing, two were employed about the canal, one was a pensioner, and the remaining three were not classified. The numbers here enumerated are not very far from the proportion of each class of people living in Preston.

It deserves mention, for the sake of those who refuse to acknowledge an epidemic influence that does not show itself on the general death-rate, that in the September quarter of 1862 the mortality from all causes in Preston was very markedly below the average, 464 deaths only being registered against 607 in the corresponding quarter of 1861. This subsidence was entirely, however, among children under six years old, and resulted, there is reason to believe, from the greater care bestowed by mothers on their infants during the time of industrial depression.

I visited Manchester at the end of November, and found two institutions into which the typhus cases occurring in the public practice of the town would for the most part be received. To the Fever Hospital attached to the work-house, those in receipt of parish relief would come; and here, on

the 26th of November, I found twenty-six patients, most of whom were cases of typhus, ten having the rash well out. The Fever Hospital of the Infirmary receives no case that is getting relief from the guardians; but in it there were two cases of real typhus, and a third had just died. Dr. Roberts, physician to the Infirmary, assured me that until the present autumn he had not seen in Manchester more than two examples of this disease. As the surgeon to the workhouse had been only recently appointed, he could not say positively what cases had been admitted in former years; but from his previous experience as a district surgeon, he felt confident that such numbers of true typhus cases as those now seen were altogether out of the ordinary experience of Manchester.

There was difficulty in getting from any record a satisfactory separation of the different sorts of fever. In the Infirmary register the cases set down for typhus were very numerous, concerning which there was nothing distinctive to be learned from the case-books; while in one or two the appearances of typhoid were found *post mortem*. The earliest instances recorded of mulberry rash was in a patient of Dr. Brown's at the end of May. Of four cases admitted in June, the history of typhus appeared conclusive in two. From that time to September no patient was admitted with true typhus; but in September there were four cases, of which two were fatal; in October one case, and in November three, of whom one died. In the Parish Fever Hospital, inasmuch as the pauper class here receives treatment, the cases of typhus had been, of course, more numerous. I made from the case-books a list of the patients admitted from Midsummer, whose disease appeared to have been typhus, and got the medical officer to revise the list for me. The typhus cases admitted from Midsummer to November 29th thus appeared to number 70, the admissions being distributed over the several months as follows:—In July, 7; in August, 8; in September, 12; in October, 20; in November, 25. The mortality among the 70 parish patients was 13; and among the 8 infirmary patients admitted since Midsummer, 3; the aggregate mortality being about 20 per cent. of the admissions.

Besides these attacks, some typhus cases were treated at their own homes. Among other cases not above mentioned is unhappily to be included the district surgeon of Ancoats, who died from it in October. Dr. Noble who attended him, told me that no instance of this true typhus fever had pre-

viously come under his notice for the last six or eight years. Dr. Noble's evidence on this point is important, as coming from a physician known to the profession, by his account of the typhus epidemic in Manchester during the years 1847-48, to be thoroughly versed in the characters of the various fevers.

The localisation of the typhus cases in Manchester and the occupations of its victims were not among the points specially inquired into.

The facts ascertained at the end of November as to the prevalence of typhus in Manchester would not have warranted an expectation of the remarkable subsidence of the disease which has since been observed. The Infirmary, as it excludes the poor who are receiving parish relief, is not to be appealed to as evidence of the amount of the fever. The Fever Hospital of the workhouse, however, is a fair guide to the degree of its prevalence. In December there were only 17 cases admitted, and from December 29th to January 13th, not one. On the last-named day there were two new cases, and there have since been several more; but of these, some have contracted the fever in other wards of the workhouse adjoining the fever wards. It would, of course, be premature to reckon yet on the complete subsidence of the disease. I have before mentioned how a similar lull, though not so complete, occurred in the fever of Preston in December, and that, nevertheless, the disease appears to be again on the increase there.—Typhoid fever, it may be mentioned in passing, appears latterly to have prevailed in Manchester to less than its ordinary amount. At the end of 1861, I am told it was seriously more prevalent than usual.

I do not propose now to comment on the existence of those unwholesome circumstances that are most generally acknowledged as the causes of typhus. In a report to Government, already in print, I have stated those circumstances in some detail for the cotton towns as a whole. Why the typhus influence should have fallen on Preston most especially I am at a loss conclusively to explain. In Manchester, the presumably greater frequency of imported typhus will, *cæteris paribus*, explain its prevalence here. It will be, however, well to point out the causes to which may be ascribed the comparative limitation of the fever in these towns. That the strict removal of the cases to hospital has had a main share in the decline of the epidemic force cannot for a moment be doubted. Indeed, this would be abundantly

proved by the spread that has been seen where the patients happened not to be so removed. Next, the maintenance of a high standard of relief, increasing almost every month, and the more liberal distribution of bedding and clothing as the winter has advanced, may be credited with much of the good result. And of at least equal importance is the circumstance that since November the weather has been singularly, almost unprecedently, mild. November, which was the coldest month since the distress began, witnessed the maximum of typhus cases both in Preston and Manchester.

In conclusion, I would wish for a moment to advert to criticisms that have been passed on my statements regarding typhus in Manchester. In a Report on the Health of the Cotton Towns in Lancashire and Cheshire, a dozen lines comprise what appeared necessary to be there said on the subject of typhus in all the towns. These dozen lines unfortunately appear to have been taken in certain quarters for the whole report, and they have further been credited with all the glosses that have appeared on them in the public prints. On going over the matter again for this paper, I am sensible of no error or exaggeration in the printed statement itself. In the opinions that have been expressed against its correctness at least five fallacies may be enumerated:—

1. A notion that the subsidence of the epidemic influence in December and January disproves the existence of such an influence in November.

2. An assumption that a low aggregate death-rate excludes the possibility of the existence of an epidemic.

3. The assumption that death-registers and records kept by busy practitioners, taking no interest in the distinctions of fever can furnish valid evidence as to the prevalence of typhus as distinguished from other forms of continued fever.

4. The attempt to gauge the amount of typhus by the experience of the Infirmary, from which the pauper class, amongst whom typhus most prevails, is specifically excluded.

5. The special application to Manchester of observations made about Lancashire at large, even when such are stated to apply with less force to this city.

ON THE YELLOW FEVER EPIDEMICS OF BERMUDA.

By WILLIAM R. E. SMART, M.D.,

DEPUTY MEDICAL INSPECTOR-GENERAL OF THE ROYAL NAVAL HOSPITAL, BERMUDA.

(*Read March 2nd*, 1863.)

THE Bermudas, a group of islands situated in 32½° N. lat., and in 69° W. long., at a distance of six hundred miles from the nearest point of the American continent, suffer epidemically from the same diseases as affect that continent within a certain distance from the equator.

The climate of this isolated group differs from that of the continent in the same latitudes. In many points it resembles that of the northern Bahamas, and chiefly so in the mildness of its winters.

There is a total absence of the regular diurnal land and sea breezes of the summer, which moderate the heat of the West Indies. That season in the Bermudas, although of tropical heat, is subject to great variations of moisture, the summers being dry or wet, irregularities unknown in tropical regions, but familiar to the inhabitants of the continent of North America.

The main points of population are at St. George's Island, the extreme eastern part of the group, at Hamilton near its centre, and at Ireland Island the extreme west.

The first of these localities is the ancient chief town, which continues to be the military head quarters. It is situated on the northern shore of an inlet, with a hilly range behind it that excludes the northerly winds, and a small islet immediately fronting its valley, that impedes the access of the southerly winds which prevail in summer. In addition to these bad topographical features, it retains all the local characteristics of those sea-side villages in England that have not advanced with the tide of civilising influences, remaining such as they were two hundred years since—unpaved, undrained and unwatered—having a graveyard in its lowest valley, cess-pits in the porous rock, and cisterns underground for the retention of water collected from the roofs of dwellings, &c.

Centres of Population

Districts usually infected

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Quarantine Islands

W. West, lith. Hatton Garden

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The second locality, Hamilton, is the modern seat of Government. It is much better situated, on the northern shore of an inlet, more freely open to the northern winds, and well exposed to those of the south; but in drainage and in water-supply it is in the same condition as St. George's, although, from its equal slope, sewerage might be easily effected, and large reservoirs or tanks might be cheaply constructed on the rising grounds in its rear. The lands at the head of the inlet are swampy, the shore being fringed with the ill-omened mangrove bush.

Ireland Island, the last centre of population, is entirely a crown possession, distinct from the colonial. It contains the naval arsenal, with its fortifications, and the convict establishment temporarily fixed there for the completion of these great national works.

Previous to 1810, when it was purchased by the Admiralty, it was a place of no note, having a very scanty population of fishermen. Since that date it has gradually risen into importance, until it now contains one of our most complete and most important foreign arsenals. During the early periods of this transition, the people employed on the great works possessed only primitive domestic conveniences, but these conditions have yielded to the hand of improvement, until very little now remains to be done to secure the most perfect hygienic conditions attainable in the country and climate.

The intervening rural districts are thinly peopled. Many dwellings of some pretension show the wealthy comfort of their owners. The labouring population is chiefly met with in the sheltered spots along the coasts, the usual homes of a fishing and sea-faring people.

The aggregate population, exclusive of military forces and convict establishment, of which the united mean strength fluctuates between 2000 and 2500, is shown by census to have stood at 11,092 in 1851, and at 11,451 in 1861, of which about 2000 dwell in the town of St. George's, and about 2500 in the parish where the town of Hamilton is situated.

The relative proportion of population to surface is about one person to each acre; but as nine-elevenths of the land are unreclaimed, or forested with cedar, only two-elevenths remain cultivated, thus increasing the proportion to nearly six persons to each cultivated acre.

The topography of the Bermudas is full of interesting facts connected with the diseases epidemic in them. A glance at

the map will detect the peculiar configuration of the island group, surrounding, as it were, more or less completely, four marine aqueous basins.

Starting from the west:—

1*st. The Great Sound,* comprising the Naval Yard at Ireland Island, and its anchorage for ships of war; the Naval Quarantine Ground at Port's Island, and the Merchant Quarantine Ground at Darrell's Island, together with the harbour of Hamilton, named after the town on its northern shore.

2nd. The Little Sound, or Harrington's Sound, a crater-like basin communicating with the sea by a narrow shallow creek. Unused by ships.

3rd. Castle Harbour, of wide extent, without a town on its shores, used only as a floating quarantine ground.

4th. St. George's Harbour, in the extreme east. The principal mercantile port, having easy access from the Atlantic. The ancient town of St. George's is situated on its northern shore.

Considerable tracts of marshy land on the main island are in continuity with the inlets of the Great Sound, receiving water from them.

The shores of the harbours frequented by shipping, or the stationary ships lying in those harbours, have been, without exception, the localities in which pure cases of yellow-fever have first displayed themselves in epidemics. In so far there has been ostensible ground for the popular conclusion "that on every occasion yellow-fever has been introduced into the islands by ships." But it must be remembered that in consequence of this intercourse of ships those localities have become the most thickly populated parts of the islands, thus affording the conditions in which the yellow-fever finds its most prolific nests.

It may be useful to fix data that may be relied on, under the head of *Epidemic Diseases in their relation to Topography:* thus the epidemic of—

1669. Affected St. George's, the only town at this period. Extent of epidemic unrecorded.

1779-80. St. George's, the only town. The disease *broke out in the gaol crowded with prisoners of war.* (Typhus?) It continued through the winter to the end of spring, committing great ravages among the old inhabitants.

1796. Began at the *West,* in Somerset, and extended to St. George's. General. Commenced early in August; ended late in December.

1812. Began at the *West*, in H.M.S. "Ruby," at Ireland Island. The troops at St. George's (East) suffered also. No proof of epidemic general through the islands. Duration, from October early, to December early.

1818. Began at the *West*, in dockyard, extended to the main island but did not reach St. George's. Local. Duration, from early in September to November.

1819. Broke out about same time, at both eastern and western extremes—St. George's and Ireland. The garrison at St. George's suffered much. From early in August till end of November. General.

1837. Began *West*, in the convict hulks at Ireland Island. Epidemic on Ireland. Scattered cases only in other islands. From middle of September to middle of December. Local.

1843. Began *East*, in the "Antelope" convict hulk at St. George's early in August, and very soon afterwards among the troops there. A month later, this epidemic fixed in the convict hulks and barracks at Ireland Island. A general epidemic from August to middle of November.

1853. First cases among convicts, Ireland Island; July. Became epidemic about same time towards end of August in the convict hulks at St. George's and Ireland Island, and soon after in the respective barracks. A general epidemic extending to the end of November.

1856. Broke out in August at several distinct points around the Great Sound. Protracted to the end of December by the late arrival of unacclimatised, and therefore more susceptible, people. A local epidemic, from beginning of August to Christmas.

It would appear that in epidemic fevers there has been a constant tendency to earliest development within the limits of the marine basin, known as the "Great Sound." The origin of these outbreaks has always been attributed to "importation", but my investigations have impressed me with a conviction that in every instance that opinion is ill founded. But in rejecting this—the most easy, but least profitable—mode of accounting for the development of an occasional pestilence, I have no new theory to propose, but shall only note those circumstances or conditions which play a secondary part in the causation of such an event, assuming that without the existence of a specific poison the particular disease cannot arise. The conditions I allude to are some of terrestrial or material, whilst others may be termed of social, character. The "social conditions" influencing epidemics shall be examined more in detail as we proceed, simply pre-

mising that in 1812, 1818, 1819, 1837, 1843, and 1853, the epidemic intensity was attained earliest, and that gradually, in the over-crowded communities of prison hulks, receiving ships, and barracks, offering very significant facts as to the laws of the growth, if not of the production, of zymotic disease.

We may endeavour to estimate the material conditions admitted to be efficient in diseases of the same class, which, being found to exist here, may account for many of the phenomena. The marsh lands of the Bermudas are topographically within the circle of the "Great Sound". These marshes are the beds of creeks, with narrow outlets, or the basin-like depressions of surface sunk below the level of the sea, saturated by percolation through intervening soil. In all cases they are either salt or brackish in the winter, becoming half-dried peaty bogs in summer, bearing luxuriant crops of cryptogamic plants, sedges, and other low vegetable organisations, which, where there are outlets to the sea, mix, in decomposing, with marine, vegetable, and animal débris carried in by the tides.

Again, the coast-line is broken everywhere into small bays and beaches, bearing at high water mark, after every gale, a hedge of sea-weed with entangled or dependent mollusks, left to decompose under the sun's heat. While, with very low tides, frequent in summer, the muddy bottoms of these bays, rich in animal organisms, are left for many hours exposed to the drying effect of the sun's rays.

These are circumstances which, in the tropics, would be considered efficient to produce miasmatous diseases; and in default of any more apparent causes, I believe that to them (as localising influences) some of the tendency of epidemic fevers to commence in the basin, where these conditions predominate at Bermuda, may with probability be attributed.

The epidemics of 1796 and 1856 commenced on the shores of the Great Sound, remote from any densely populated centre, and among scattered dwellings of the poor.

As the essential cause of yellow fever has eluded scientific research, and may do so for ever, it becomes a matter of great practical utility to search out and define the circumstances under which it has become epidemic and endemic.

On several occasions it has happened that the yellow fever has become very widely spread at Bermuda, and quite as virulent as in any localities usually regarded as its indigenous seats. I am of opinion that a thorough investigation of the yellow fever epidemics of the Bermudas, would define with accuracy the features of these visitations, and

the laws of their development and spread. In the unfortunate event of their recurrence, much more might be done to elucidate the etiology and pathology of this terrific scourge, concerning which so much uncertainty still exists.

Perhaps few places afford a more trustworthy body of evidence on this subject than that comprised in a pamphlet published at the request of Sir William Reid, after the epidemic of 1843, and in the Reports of Commissioners of Inquiry, subsequent to the epidemics of 1853 and 1856.

I shall endeavour to collate the evidence thus offered, and to add such data as can be gathered from the records of the Naval Hospital, which is the largest in these islands.

In the pamphlet authorised by Sir William Reid, the following dates are fixed as those in which epidemic fevers ravaged the Bermudas,—viz.:—1699, 1779-80, 1796, 1812, 1818, 1819, 1837, 1843, to which we may now add 1853 and 1856 of later dates.

Tradition is the only guide to our knowledge of the epidemic of 1699. That it was very severe to have remained so long remembered is a just inference; and although a period of eighty years elapsed without record or tradition of another epidemic, that is no proof that none occurred in the long interval.

The years 1740, 1747, 1762 are noted as those of severe epidemics on the American coasts, but it is not probable that they were periods of similar calamity in the Bermudas, as neither tradition nor evidence alludes to them as disastrous.

Governor Reid did not discover any reliable evidence of earlier date than 1779-80, concerning which epidemic he states in 1843, "There are persons still living who had that fever, and several alive whose parents died of it." He fixed 1780 as the earliest epidemic period to be reasoned on with accuracy; and although the facts published by him concerning it are few, yet they are very important, because they are sufficient to raise a doubt of the identity of that epidemic with yellow fever, as it seems to have broken out so late as November in a gaol crowded with prisoners in a state of utter filthiness and abject want, and to have spread thence amongst the inhabitants, with increasing epidemic force through the winter months. These facts induce me to believe that the disease of 1779-80 was typhus and not yellow fever.

1796. Of this epidemic, Dr. Augustus William Harvey, an eye-witness, has left so graphic a description in a letter to Sir William Reid, that no question rests concerning its

identity with yellow fever. He describes its onset to have been highly inflammatory: "Severe and sudden headache, pains in the back, occasional delirium, eyes red, sparkling, and watery, and these symptoms by far more evident in Europeans than in natives."

During that and the preceding and following years, the malady existed with more or less frequency in the coast cities of the continent, as high as New York in 43 degrees N. latitude.

This visitation resembled that of 1699 in being contemporaneous with a yellow fever epidemic on the mainland of America. The epidemic of 1779-80 differed from both remarkably in this feature of their history:—the American coast not having suffered in those years.

1812. The fever of this year was "chiefly confined to the ships lying at Ireland Island, and the troops quartered at St. George's."

It has been reported by Dr. Hunter, health officer, still resident, "to have broken out on board the 'Ruby,' at Ireland, and clearly proved to have proceeded from a quantity of cordage and canvas in a pent up hold, which had run into decomposition from a quantity of water leaking in."

I would remark that this being evidence, from personal recollection, by a Colonial Health Officer who on every other occasion of epidemics has consistently advocated the opinion of "importation," it may be relied on that no suspicion of its exotic origin was then entertained.

Its severity may be best judged from the records of the Naval Hospital, which show that of 112 cases admitted, 27 died, being a mortality of 25 per cent. under favourable circumstances of treatment.

In the same records it is shown that this epidemic became clearly marked about the 7th October, on board the "Ruby," spread afterwards to other ships and to the dockyard population, and that it suddenly lost its intensity about December the 8th, after which date very few cases occurred.

It seems to me to offer the earliest attainable evidence that yellow fever of the severest grade can be of indigenous growth within these islands.

In 1817 the true type of epidemic yellow fever presented itself again in the United States at Charlestown. Bermuda was visited by an epidemic of the disease in the following year, 1818, and with a recurrence in 1819, stated to have been imported by ships of war from the West Indies.

1818. Early in that year there was unmistakable evidence of some morbific causes in operation.

In the spring an unusual number of cases of pneumonia and other chest affections were admitted from the shipping. In the beginning of July there were numerous admissions from the dockyard of bowel affections, as dysentery, cholera, and enteritis, varying in point of severity. This state of things continued without any mortality until the 2nd of September, when a case was admitted that terminated fatally on the 5th of September, under which entry there is in the margin a notation, "The first case of yellow fever." After that, the admissions were almost exclusively of fever, many of them ending in death on the second or third days after admission.

There were 105 treated in hospital, with 28 deaths, being a ratio of 26.6 per cent. It has been generally affirmed that this fever had been imported in a ship of war from the West Indies.

On examination of the Naval Hospital records, I find that, previous to the epidemic outbreak among the dockyard men in September, only one case of fever had been treated that year. It was from H.M.S. "Harrier," admitted 3rd of May, and discharged 21st June, entered simply as "Fever," of which no further particulars are ascertainable, nor can the port whence the ship came last be learnt, but that she came from the West Indies, and was the only ship of war that could be brought in question, is certain.

It is inconceivable that a ship so healthy as to require to send only four patients—one being fever—to hospital between the 3rd May and the 28th July, could have been the means of infecting the colony with yellow fever so late as September.

1819. The epidemic of that year was remarkable for its fatality at St. George's, which had escaped in 1818. This may have arisen from the fresh nidus afforded by a new body of unacclimatised people: the 15th Regiment, which, landing there in July, had lost eighty-eight men at the termination of the epidemic in October.

The Naval Hospital records prove that at Ireland dysentery and liver affections prevailed in the early part of the year, as precursors of the fever of the autumn, which commenced on August 7th in the dockyard, and on the 22nd August on board the "Euryalus" frigate; and that throughout September the admissions to hospital were almost exclusively for fever, which took on epidemic in-

tensity about the 17th September, and ceased abruptly on the 28th of November.

The "Euryalus" appears to have arrived at Bermuda early in August, when fever had just shown itself among the dockyard artizans. She remained until the 18th of October, and then proceeded to sea, taking with her her convalescents from the hospital. The appearance in her of two cases of "cholera morbus," one of which died within forty-eight hours, was a pretty sure indication of a severe visitation. Out of twenty-two cases from her, six died in hospital, and she sent cases up to the second day previous to her sailing. Dr. John Wilson has recorded the subsequent history of this ship. She anchored at Barbadoes in October, with a number of fever cases on board, of which two died while she lay there. The hospitals being shut against her sick, she had again to put to sea, and went to the Danish island of St. Thomas's, where her sick were received ashore and mostly recovered.

The total of fever cases treated in hospital was 106, of which 25 cases died, being 23½ per cent. The epidemic expended its force at Ireland Island, mainly on the artizans of the dockyard and on the crew of the "Euryalus." It is very interesting to observe that in the detachment of the 15th Regiment that garrisoned Ireland not a single case terminated fatally, while their comrades at St. George's were suffering extremely.

The advocates of importation allege that this visitation was introduced by a vessel called the "Tartar," that had lost several of her crew by fever at the Oronoko, and went thence to Jamaica without losing any person on the voyage. From Jamaica she reached St. George's on the 5th July, on which day a man died on board of "phthisis, in its last stage," according to the report of the health officer who visited him. On the 7th and 14th August fatal cases of fever occurred at St. George's, and then it was recollected that the corpse from the "Tartar" had turned *quite yellow* before inhumation.

On such data the statement of importation was raised and maintained. On the other hand, it must be remembered that the fever epidemic of 1819 was preceded on Ireland Island by the same category of zymotic diseases, indicative of a growing epidemic as that of 1818 had been, and that fever cases presented themselves as early at Ireland, as at St. George's, although of less fatal character there at first. I conceive, therefore, that the "Tartar" must have had as

little influence on the epidemic of 1819, as the "Harrier" on that of 1818.

The history of yellow fever epidemics in the coast cities of the United States, possessing a winter climate that renders the extinction of the disease by cold an eventuality of more regular occurrence, shows often a succession of yellow-fever seasons. Local causes are believed there to be efficient in the reproduction of the specific disease, season after season.

1837 is the next date of an epidemic of yellow-fever, which was not general through the islands: Ireland being the centre of epidemic, which elsewhere presented only a few malignant cases, engrafted on a much milder type.

There is no evidence that the disease was seen that year in the cities along the eastern coast of the United States, but it prevailed with great force in the West Indies and on the West Coast of Africa, and it was confidently asserted to have been imported into Bermuda from the Havana by H.M.S. "Seringapatam." The grounds of this assertion are worthy of examination.

In the long interval of exemption since 1819, there was effected a great change in the dockyard system. The public works, which at that date were in the hands of artificers drafted from the home dockyards, assisted by free labourers of the colony, had, since 1824, been executed by convicts, dwelling in hulks moored in the dockyard basin.

Among the former class who received large wages, where rum is a cheap commodity, delirium tremens was peculiarly frequent and fatal; but with the convicts who supplanted them, dysentery and diarrhœa were always, and scurvy was often, prevalent. It might have been foretold that yellow fever, once begun in either of these communities, would meet with less resistance to its spread than under ordinary circumstances of public health. The advantage on the side of the prisoner, in being prevented from long continued indulgence in spirit drinking, was more than counterbalanced in his insufficiently varied diet, and in his crowded dormitory.

As a result, when yellow fever appeared, the convicts were the first to suffer from the essential causes, and the first to reproduce the specific form of disease in the epidemics of 1837, 1843, and 1853.

Up to May 1848, the Naval Hospital was the sanitarium of the sick convict, as well as of the sick soldier and sailor. Its records furnish, therefore, to that time, the best data of the general health, as well as of that of each division of the population of Ireland Island.

The admission-book of the period displays how that complication of diseases, which ordinarily precede yellow fever epidemics, was gradually growing up from the early summer of 1837.

Zymotic and allied Diseases.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Catarrh	10	4	10	6	5	4	4	4	...	...
Diarrhœa	3	4	13	8	8	3	5	5	1	...
Dysentery	...	1	3	5	14	3	1	2	6	3
Enteritis	...	1	...	...	...	...	...	...	...	1
Hepatitis	...	...	...	1	...	2	...	...	1	1
Cholera	...	...	...	...	...	...	1	...	...	...
Fever	...	...	...	...	1	2	4	109	18	7
Totals	13	10	26	20	28	14	15	120	26	12
Total admissions for all diseases	26	21	41	35	46	28	28	145	52	41

As these phenomena will be found repeated on other occasions, especially in 1843, through a still greater yellow fever epidemic on Ireland Island, it may be taken as a criterion of the existence of those epidemic morbific causes that culminate in yellow fever. It is clearly proved that from the month of May there was some morbific cause that fell on the secreting surface of the intestinal canal and the liver, producing, in the first place, increased exhalation or secretion, and later, inflammatory action; and that these manifestations merged into yellow fever, which we are accustomed to regard as a specific disease, whereas it is, possibly, only the last link, under conditions not yet accurately defined, of a series of diseases familiar to us.

Diarrhœal disease reached its climax suddenly in May; dysentery followed in its track, and became predominant in July, when fever commenced to display itself. On the 19th of September, the first case of yellow fever was admitted from the convict hulks, and before the end of the month others came from two points of the free population, —the dockyard island, and the receiving ship for the navy.

There were three distinct foci of the dreaded disease in active operation, when a ship of war, the "Seringapatam", arrived from the West Indies, where she had suffered from fever. Her arrival dates 5th October, and as, within a few days after that date, the disease assumed the true epidemic character on Ireland Island, she was at once fixed on as the introducer of the malady. The facts connected with the ship's history are these :—She arrived at the Havana from

England on the 22nd August, and fever appeared among her crew on the 2nd September. She sailed from the Havana on the 9th September. Up to the 16th September there had been in her 76 cases without a single death, although the symptoms were "highly characteristic of yellow fever." She arrived at the dockyard on the 5th October, and was reported to have only two cases on the surgeon's list, and those from accidents.

On the 19th October, Mr. Kennedy, the surgeon of the hospital, represented to her captain that, as "typhus icterodes" was present among the population of the island, it was advisable to remove the ships of war to the outer anchorage, and to hold as little communication as possible with the shore. It may be inferred from this that no fever then existed in the "Seringapatam." On the 23rd October, seventeen days after her arrival, she sent her first case of it to the hospital, and five subsequently, of which one terminated fatally. Mr. Kennedy asserted the local origin of the epidemic, and reported officially that the first case of yellow fever received into hospital was from the convict hulk on the 19th September, which statement should place it beyond a doubt that the "Seringapatam" did not influence the epidemic, as she arrived on the 5th of October. It has been also currently stated that the "Seringapatam" introduced "fomites" of the yellow fever—in the rigging and other stores of H.M.S. "Romney" dismantled at Havana, which she put on board the "Royal Oak," after the 5th October; but it has been averred by a medical officer serving at the Naval Hospital that the "Royal Oak" had sent a case of yellow fever to the hospital on the 29th of September, six days before the arival of the "Seringapatam."

The extreme susceptibility of this disease in newly arrived persons, and the benefits of a speedy removal from an infected locality were strongly illustrated by H.M.S. "Pearl." She arrived from England on the 6th October, and in order to refit ship, her crew were turned over to the "Royal Oak" receiving-ship, from which a case of yellow fever had been sent to hospital as early as the 29th September. On the 15th October, the disease commenced among her crew, three of the earlier cases terminating fatally. On the 20th October, the crew of the "Pearl" were removed from the "Royal Oak" to Port's Island, after which no fatal case occurred, and the disease soon became extinct in her.

The protective effect of a more free exposure to currents of air was exemplified in the two convict hulks, of which the

one lying with bow to the eastward, the quarter from which the wind prevailed, was attacked on the 19th September, and presented a mortality-rate of 23 per cent. to attacks, when the sister-ship inhabited by men living under exactly similar conditions of diet, labour, and rest, lying with broadside to the wind, had no case for hospital before the 16th October, and shewed a mortality-rate of 10 per cent to attacks.

1843 was the year of a very extensive and severe epidemic of yellow fever.

A widely-spread tendency to febrile diseases existed from the earliest spring season. Low adynamic continued fever, and *bilious remittents*, were met with in several localities not only in the towns, but in some country districts.

Among the troops at St. George's there was a great prevalence of diarrhœa. The records of this hospital afford indisputable proof that a similar "epidemic constitution" was growing up in the establishments at Ireland Island to that which had preceded the epidemic of 1837; the category of precursory zymotic disease merging into the one form, fever, at the climax of the epidemic.

Epidemic, Zymotic, and allied Diseases, treated in the Naval Hospital during the Summer and Autumn of 1843.

DISEASES.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Measles	2	1	3	1	...	...	...	...	...	...
Cynanche	3	...	1	1	...	...	...	...	...	...
Catarrh	3	...	14	4	...	...	...	...	...	...
Diarrhœa	4	...	8	11	6	4	1	...	...	...
Dysentery	1	2	5	10	7	14	8	1	1	...
Cholera	...	...	...	2	1	8	...	...	...	...
Hæmoptysis	...	...	2	...	...	...	...	...	...	...
Hæmatemesis	...	...	...	1	...	...	...	...	...	...
Hæmaturia	...	...	...	...	1	...	...	...	...	...
Erysipelas	...	...	1	...	1	1	...	...	...	...
Fever	3	1	6	6	7	210	371	377	79	3
Totals:	16	4	40	36	23	237	380	378	80	3
Total admissions of the month	43	22	60	75	61	266	385	385	85	22

In this visitation as in that of 1837, diarrhœa and dysentery were the ordinary forms of the precursory bowel disorder; while *cholera* in the "Dromedary" convict hulk indicated, in June, that she would become a centre of the epidemic in its most intense form later in the season.

In the "Tenedos," lately arrived from England (on 9th

July), filled with convicts, the first impulse of the epidemic constitution made itself known in the form of cholera chiefly. The 10th of August was the date of the first admissions to hospital from that ship. The cases received comprised, fever four, dysentery two, colic one, cholera eight: a list which contains the antecedent indication of a very severe visitation in her.

The fever was earlier in its outburst and epidemic intensity at St. George's than at Ireland Island.

Locality.	DATES OF THE EPIDEMIC.			
	Earliest case of yellow fever.	Epidemic intensity.		Last case of yellow fever.
		Commencement.	Termination.	
St. George's.	July 12.	Aug. 10.	Aug. 31.	Nov. 7.
Ireland.	July 21.	Sept. 15.	Oct. 25.	Dec. 12.

These dates are of value in considering the statement of importation, inasmuch as the earliest germs were alleged to have been received from a mail-packet steamer, the "Tweed," which coaled and communicated freely at Ireland Island only.

Those, who maintain the foreign origin of this epidemic, base that opinion on the assertion of the master of a merchant vessel that unloaded stores at the dockyard, when the "Tweed" arrived there "in pratique" from the West Indies. This assertion was to the effect that the master of the "Tweed" cautioned him not to allow his crew to communicate with the "Tweed;" and that in spite of his injunctions a boy did so communicate frequently between the 12th and 15th of June. His vessel left the dockyard and went to St. George's, where the boy was landed on the 17th June, and "died with such symptoms as usually attend the last stage of yellow fever," on the 23rd June.

Even if this were the earliest case of yellow fever on the islands, it occurred in an unacclimatised person lately arrived from Europe, and consequently highly predisposed to suffer from the endemic causes of disease, which, as has been shewn, had been growing up in Ireland Island since April. It seems to me that to attribute this boy's disease to his visits to the "Tweed," and to fix thus the onus of importation on that vessel, we must adopt the following propositions:—

1st. That the commander of a royal mail packet obtained

pratique on his declaration of the good health of his crew, and immediately afterwards made an unreserved statement of quite a contrary nature.

2nd. That the vessel thus charged with importation between the 12th and 15th June, ran back to St. Thomas's, an almost perennial source of yellow fever, returned to Ireland Island, Bermuda, the 27th June with "a clean bill of health," and remained there until the 1st July "unsuspected."

3rd. That in pratique at Ireland Island, in June, she disseminated germs of disease widely in that locality, none of which, however, sprung into activity there until the 21st July; thirty-four days later than the date of their transmission to a distant locality, St. George, by the boy in question.

4th. That by the contagion through the person of this boy, who had been on board the "Tweed" at Ireland Island, yellow fever became epidemic at St. George's on the 10th August; while at Ireland Island, where the "Tweed" lay in pratique in June, the disease did not become epidemic before the 15th September, or five weeks later at the primary than at the secondary centre of infection.

These data being accepted, it must be admitted that the communication of the specific virus may be more speedily effected by intermediate agency than by direct action.

Dr. Gilbert King, at the time Deputy Inspector of this hospital, reported officially his opinion that the epidemic was of indigenous and not of exotic origin. He was familiar with the disease from his previous services in the West Indies.

It is worthy of remark that, although the coincidences of yellow fever epidemics at Bermuda with those of the United States are very striking, yet the advocates of the importation theory have attributed it in no instance to that source. To the West Indies alone they have been accustomed to look for the supplies of virus, without which they contend yellow fever does not spring up in the Bermudas. This improbable story of importation by the "Tweed" was started when an epidemic of yellow fever was developing on the continent, in 10 degrees of latitude north of Bermuda.

In Sir William Reid's pamphlet it is noted that "A fever precisely of the same nature as that of Bermuda prevailed at the same time at Rondout, on the Hudson, one hundred miles north of New York. It is remarkable that in both localities the fever was preceded by epidemic influenza, and followed by scarlatina." Now, from the geographical position of Rondout, it is improbable that it should receive the germs of yellow fever from a southern climate, unless

through New York, as an intermediate resting place; but there is no evidence that that great city was visited by epidemic yellow fever that year.

I am not informed that the inhabitants of Rondout regarded the causes of their visitation as of any other than of local origin. In fact, the present century has witnessed a great change of popular as well as of medical opinion, concerning the etiology of this scourge of American cities. These great cities, in that utter prostration of mind and will produced by very frequent epidemics, looked on them in the eighteenth century as coming from afar, directed by the hand of an offended and wrathful Deity, to punish them for their spiritual offences; and accordingly they bowed down to such visitations, as Mussulmans are prone to do amidst the plague, in resigned submission to the presumed will of God. During the present age they have become sensible of the small reasoning voice that raised its tones first in the midst of their greatest sufferings. They have carried into effect the recommendations of commissioners appointed "to devise means best calculated to prevent the recurrence of epidemics", and have made such changes in their municipal and domestic economy as have ensured to themselves prolonged periods of immunity. Taught by such frightful experience they now, in seasons of alarm, see only the necessity of more stringent regulations, and, perhaps, of further sanitary improvements, hoping thereby to eradicate ultimately even the local disposition to reproduce sporadic cases in each autumnal season.

1853. In this year yellow fever of a most destructive type was epidemic in these islands.

The "epidemic constitution," essential to the production of the disease, was of wide extent. It had commenced in the West Indies in the autumn of 1852.

The sufferings at Barbados of the crews of H.M.S. "Dauntless" and "Highflyer," both of which had become infected at St. Thomas's in November 1852, shew the virulence of the disease at its earliest date. In the following year its ravages were felt generally throughout the West Indies, and they extended in epidemic form along the coasts of the United States from the estuary of the San Jacinto and Trinidad rivers in the Gulf of Mexico, to the banks of the river Delaware, in 40 degrees, north latitude. The city of Philadelphia, which had frequently, on previous occasions, been simultaneously affected with the Bermudas, was so on this. Although the number of cases reported at Philadelphia was

not very large, yet the ratio of mortality to attacks—75 per cent.—is conclusive as to malignancy of the type, and is suggestive of horrors perhaps equal to those of any previous epidemic, had that city not striven, through thirty years, to correct the conditions deemed influential in fostering the causes of the disease.

In Philadelphia, the epidemic lasted from the 19th of July to the 7th of October.

At the Bermudas, the earliest case reported was from the convict prisons, on the 5th of July, from which date cases occurred with greater or less frequency to the end of the year.

The positions, in which the epidemic was most severe, were the barracks and the convict hulk at St. George's, and the barracks and convict hospital-ship at Ireland. On the other hand, the almost entire exemption of the native population of the islands in general, and the comparative immunity of the dockyard artificers were striking facts, illustrative of the laws that govern the spread of the disease, and of the sanitary principles that counteract these laws.

A large body of very valuable evidence concerning this epidemic is to be found in the published report of a Commission composed of the Attorney-General, the Solicitor-General, and Commandant of the troops, in the colony. That report contains many very interesting details.

In transmitting the report of the commission to the Secretary for the colonies, the officer, administering the government of the Bermudas, writes as follows:—"But few can, I fear, fail in arriving at the conclusion that the fever was engendered at Bermuda. That it was not imported by any of the vessels to which the Commissioners' inquiries were directed is, I think, clearly established. It broke out in so many places simultaneously that their investigations have failed in determining its distinct origin; but it appears to have been early foreshadowed by various premonitory symptoms among the convict establishment at the western end of the colony, a decided case having occurred on board the "Tenedos" hospital ship, off Boaz Island, as early as the 5th of July."

In the above observations definite allusion is made to the antecedence of a very alarming sanitary condition among the convicts, the particulars of which are to be found in the official letters of Dr. Hall, medical superintendent, to the Governor, from which the following extracts are made. Under date 6th June, Dr. Hall wrote to his excellency:—"The disease termed *cholera* is customary here at this season

of the year, and it always affects the most susceptible of the infirm or unacclimated prisoners, but has been hitherto seldom attended with mortality." "Among many of the cases of *cholera* that have presented themselves during the last few days, *a degree of malignity* has presented itself, of which two prisoners have died within the last twenty-four hours; and from many severe cases of dysentery that have been admitted into hospital during the last two months, I apprehend much sickness will prevail among the convicts during this summer." "*Fever* has not yet appeared in the convict establishment."

Again, under date 9th July, to the same:—"Cholera still prevails, attended with dysentery and also fever. Of this disease cases are daily occurring, but the character of it is at present only of the common type of fever of the hot season. Although several cases have been admitted, yet one only has proved fatal."

The case of death by fever thus reported presented "jaundice of the skin and eyes without the pathognomonic symptom of 'black vomit.'"

Between that date and the 14th September, there were seven fatal cases of fever among the convicts, the black vomit not being seen until the 14th September, when a man who had been admitted with dysentery on the 1st September, took on fever symptoms on the 10th, and died with "black vomit" on the 14th, being the ninth death by the fever, before the pathognomonic symptoms of *yellow fever* appeared. This series of events proves the necessity for extreme caution of prognosis in yellow fever climates, when in the summer season severe cases of fever present themselves, based as it were on a precursory tendency to enteric derangement of the choleraic and dysenteric types.

This premonitory epidemic is well described in the records of the naval hospital by Deputy-Inspector Hilditch, from whose return for the quarter ending 30th June, 1853, I shall take the liberty of quoting:—

"The tendency to catarrhal complaints noticed in the last quarterly report, gradually subsided, but was followed in May by the prevalence of bowel complaints among the inhabitants of those islands generally, the most severe cases occurring in the convict part of the population, seven or eight cases terminating fatally.

"The symptoms generally were those of cholera, and in the fatal cases *of the Asiatic form of the disease.*

"Several patients in this hospital, in May and June, were

affected by an irritable condition of the mucous membrane of the bowels, in one case running into dysentery.

"This irritable state has subsided.

"The cause of these affections seems to be some peculiar condition of the atmosphere, persons of every condition of life having been attacked: the weak, as might be expected, being more obnoxious to the exciting cause."

Such is the correspondence of the state of things precursory of the yellow fever of 1853, thus described by such authorities as Drs. Hilditch and Hall, with the proofs already produced in my remarks on the early stage of the epidemics of 1837 and 1843, that it would be a work of supererogation on my part to enter into minute details of the guise in which yellow fever epidemics usually make their approach in these islands.

The three instances so defined as these of a succession of epidemic catarrhal affections of the respiratory organs, followed by epidemic disorder of the gastro-enteric mucous surface and its collateral glands, which in turn yielded to or blended with a febrile diathesis of disease that at its climax assumed the yellow-fever type, ought, I think, to afford conclusive evidence that this dreaded disease arises by a regular process of growth, and needs no exotic germs for its production in the Bermudas.

The frequent coincidence of these visitations with the epidemics of the continent seems to me to indicate a wide diffusion of atmospheric agencies, technically termed an "*epidemic constitution.*"

The comparatively bad sanitary condition of the convicts employed on the public works is well displayed in a table drawn up by the late Mr. Anderson, C.E., in charge of the Admiralty buildings, for the information of the commission, and published in their report, from which table this abstract is made for the months preceding the epidemic, the percentage being that of the last day of each month. This may, I think, be accepted as a relative standard of the public health, in a healthy and in a sickly season, before an epidemic of yellow fever.

Percentage of Sickness to Strength.

Date.	April.	May.	June.	July.	August.
1852. Year healthy	15·6	15·6	19·7	19·7	18·8
1853. Year sickly	17·5	23·4	32·5	33·7	34·0

Having thus elucidated the nature and the extent of the disorders alluded to by the Acting Governor, in his statement that the epidemic yellow fever of 1853 was "foreshadowed by various premonitory symptoms," I shall next proceed to define his grounds for affirming that "the fever broke out in so many places simultaneously as to prevent the commissioners from determining its distinct origin."

At the western extremity of these islands the earliest death by fever was on the 5th July, in the convict establishment, Boaz Island. Jaundice was present in this case. The earliest case with "black vomit" occurred on the 14th September, there having been seven fatal cases of fever *without either jaundice or black vomit* intervening between the two dates.

At the eastern extremity the earliest fatal case of fever was on David's Island, on the 2nd August. *Black vomit* was present. This was the earliest case of unmistakable yellow fever seen in the islands. It is remarkable as having occurred in a native, ordinarily less susceptible of this specific form.

The early cases were confined to these two localities—the extremes of the islands.

The precursory diseases seem to have been alike in both places, but at the western end the fever was slow in acquiring the yellow type, while at the eastern focus of disease the first case of fever reported ended with black vomit, no similar case occurring again for twenty-five days, after which the epidemic took on its highest intensity very rapidly. The intermediate cases in the twenty-five days had been "*of ordinary 'bilious remittent,' some of them having vomiting and jaundice,*" according to official reports.

Locality.	DATES OF THE EPIDEMIC.			
	Earliest case of death by fever.	Epidemic intensity.		Last case of yellow fever.
		Commencement.	Termination.	
St. George's ...	Aug. 2.	Aug. 18.	Middle of Oct.	Oct. 15.
Ireland Island	July 9.	Middle of Aug.	Nov. 21.	Dec. 9.

I regret not having it in my power to fix with exactitude the dates, because, from a sufficient number of instances well recorded, we may be able to define within what periods danger will occur from the admission of sickly ships to pratique.

The epidemic of 1853, in so far as it affected the Government establishments on Ireland Island, afforded most instructive examples of the immense advantages of permanent

domiciliary improvements, and of sanitary measures suited to the occasion, in restricting this epidemic disease to its milder form. Further, its history displays prominently the circumstances under which the morbific causes acquire a degree of propagative power which, at least, simulates that recognised as "direct infection by miasmata arising from the sick." And lastly, in the success of measures used then to prevent the further spread of this deadly influence, there is exhibited the best mode of action, when the disease has evinced its unmistakable symptoms in any locality.

The population of Ireland Island consists entirely of Government people—1st. Those employed in the naval yard and hospital under the Admiralty. 2nd. The military under the War Office. 3rd. The convict establishment, under the Colonial Office.

The extent and mortality of the epidemic in the different establishments is shown in the following table:—

Approx. strength on the first outbreak of the epidemic.	Attacks.	Per cent. to strength	Deaths.	Per cent. to strength	Per cent. to attacks.
Naval Yard 419	29	7	0	0	0
„ Hospital..... 52	22	42	4	7·7	18·0
Troops 440	74	17	22	5	29·7
Convict Establisht. 1462	468	32	88	6·0	18·8

The chief features of this table are—

1st. *Naval yard* officers, artificers, and their families, enjoying comparatively great immunity from epidemic disease, and complete exemption from its fatal type or degree.

2nd. *Naval hospital* officers and their households, and attendants on the sick suffering disproportionately in number of attacks and in mortality.

3rd. *Military garrison,* presenting the highest aggregate amount of fatal cases, in proportion to attacks of fever.

4thly. *Convict establishment,* with a high per centage of cases, essentially of a milder type of disease than that of the garrison, the mortality being increased by disadvantageous circumstances connected with hospital accommodation.

In investigating the disparities prominently displayed in the table, the following facts, recorded in the evidence collected by the Commission of 1853, seem to me to be worthy of being adduced.

1st. With regard to the NAVAL YARD.

The evils arising from the imperfect style of dwellings erected for the workmen in the earlier days of the establish-

ment, had been corrected by the continuous efforts of the Admiralty, until well-built houses, ranged in airy positions, were provided to meet the ordinary wants of the artificers likely to be employed in times of peace.

In 1849 a water-closet in every newly-built house, with sewerage to the sea, was substituted for a system of privies and cesspits that had been used previously. This new system is at the present time, 1862, almost universal, and it is being perfected by the erection of a steam-engine to pump sea-water to the highest level for the purpose of flushing the sewers.

By this gradual change the occupants in 1853 found ample room for their numbers, improved ventilation, and a water supply best suited to the locality and climate.

The good effects of these changes are well shown in a table by the Admiralty Engineer, the late Mr. Anderson:—

Population.	No. of dwellings.	Average cubic space per person in the dwellings.	No. attacked by fever.	Deaths from fever.
1843... 444	62	1·870	162	11
1853... 419	92	2 921	29	0

This liberal house accommodation was, however, limited to the European artisans, those of colour having to find their own dwellings on the adjacent islands. According to Mr. Anderson's report, the greatest percentage of sickness to strength among the artisans, in the spring and summer of 1853, existed entirely among the mulattoes and coloured people; thus exhibiting a circumstance contrary to the usual order of things in yellow fever epidemics, that Europeans were rendered less obnoxious to epidemic causes than the native population employed with them.

Another strongly marked advance is discoverable in the "morale" of the Dock-yard population. Formerly the admissions to hospital with *delirium tremens* were a great item in the returns. This important cause of disease during epidemics, if it had not entirely ceased to exist, was no longer a decided feature.

In addition to these great permanent advantages, there was another special to the occasion. In order to remove any still existing defects, and to maintain household cleanliness, a sanitary commission, endowed with powers of household inspection, was instituted the first week in September, when none but mild cases had appeared on this island; and its

recommendations were carried out as far as could be done by the Naval authorities.

Dr. Hilditch has thus described the precautionary measures then carried out:—"The number of persons inhabiting each house was reduced, the ventilation was improved, where considered necessary; privies and tanks were cleared out, and chloride of zinc extensively used."

By these measures, some permanent and some suited to the occasion, this comparative immunity of the Dock-yard population was secured. The extent of their immunity is thus described by Dr. Hilditch:—"Of 419 belonging to the Naval-yard, 29 were attacked by febrile symptoms, but only 7 proved to be cases of the epidemic, and they all recovered."

The next division of the community is that of the NAVAL HOSPITAL, comprising but a small body, which suffered inordinately both in the number of attacks and in the ratio of deaths.

Deputy-Inspector Hilditch, in his evidence to the Commission, states, "That in his experience at Jamaica Hospital none of the attendants were attacked, but in this, eight out of ten individuals employed in the wards were attacked, and two died." "The steward, who had very little intercourse with the patients, died, and two of his family, living with him, fell victims after his death." "All the medical officers, four in number, were attacked, and recovered, two having been in great danger."

Of this disproportionate mortality, three deaths occurred in one house, and two of these in individuals who merely resided there, having no direct communication with the sick in the wards, while the first of them to fall,—the steward—had also very little intercourse with them. Their residence lay on an isthmus at the rear of the hospital, having on the shore about thirty yards in front of it, the mouth of the only sewer from the hospital, and at about the same distance at its back, a lagoon which received directly the filth of the post mortem-room, standing between it and the house. This lagoon had but one exit, at its furthest extremity, and in hot weather it constantly emitted offensive smells. These were still more offensive during the epidemic; which state, it was thought, arose from the increase of interments in the cemetery on its opposite shore, from the water entering the graves, and, on the falling of the tide, passing into the lagoon charged with decomposing animal matter. Several

sentries posted near the mouth of this lagoon were attacked by the epidemic, and at length the post was abandoned.

These facts explain the most disadvantageous situation of the cottage, the scene of three-fourths of the mortality. But notwithstanding such evident disadvantages of place, it is a noteworthy fact that the first attacked in the house had had communication with the sick in the hospital wards, and the other two who died, being his relations and dependents, must have attended on him through his illness.

Being natives they were less susceptible, but, surrounded as they were by very bad sanitary conditions, they fell easily victims. There is no record of the dates of attacks and deaths in these last cases.

The other fatal case was the dispensary man, whose duties comprised those of head nurse, which, on such an occasion as this, became of necessity most fatiguing and harassing, leaving scarcely any chance of a due amount of rest and freedom from cares of office.

The medical officers underwent unusual exertion and anxiety throughout this trying period, but not one fell a victim. When off duty, or when sick, they retired to conveniently placed homes, and although attacked with severity, yet all recovered.

It is clear that a high degree of epidemic intensity became localised around the hospital, and that this did not display itself until after the reception of thirty-three very bad cases of the adynamic type of fever from St. George's on the 29th September.

The steward was attacked 5th October, and died on 12th.

The dispensary man on 16th, and died on 28th.

The medical officers began to fall sick on the 25th October, and by the 3rd November, in the height of the epidemic, all of them had been attacked.

Regarded abstractedly, this part of the statistical table certainly supports the idea of "contagion," but the facts of locality and of harassing duty being duly considered, seem to me to weaken the notion.

The extent of the epidemic among the MILITARY STATIONED ON IRELAND ISLAND becomes the next point of inquiry.

At the commencement of the disease the different bodies of troops occupied their usual quarters. The strength and stations of the force on the 7th September, and the extent to which the different corps were affected by the epidemic, are shewn in the following table:—

Where Quartered.	Strength.	By Epidemic.	
		Attacks.	Deaths.
Royal Artillery. In the fortress or keep, in roomy good quarters	48	7	1
Royal Engineers. A detached building on open ground, outside the walls	48	5	0
56th Foot. In casemate barracks, within the walls of the Dockyard	303	62	22
„ In guard room at Boaz Island	42		

This marked inequality of disease and mortality among soldiers stationed in the same garrison, and thus apparently obnoxious to the same essential causes of epidemic disease, will, on investigation, yield important information as to the secondary causes that aggravate the morbific effect of the essential specific agency. I shall note the facts recorded, especially those with regard to habitation and occupation.

The Royal Artillery possessed a barrack, roomy and well ventilated, situated on an elevated remote part of the island, and their ordinary accommodation was increased by the quarters of two officers being given up to the men. Their guard duties were restricted within the limits of the Keep.

Deputy-Inspector Hilditch states in evidence that the first case on Ireland Island shewed on the 27th August in the person of an officer of Royal Artillery, stationed in this barrack. As this officer had not been, during the previous month, at St. George's, the infected locality, his attack must be considered indigenous to Ireland Island.

Captain Lacey, 56th Regiment, who commanded the garrison, has stated in evidence, that of those attacked belonging to the Royal Artillery, only three cases could be said to have taken the disease at these barracks, "since four of them had been at St. George's, where it may reasonably be supposed they contracted the disease; and the non-commissioned officer who died of it was attacked some time after his admission to hospital with sprain."

Allowing some weight to this statement, it is remarkable that if four had contracted the disease at a distance, and were attacked after arriving at these barracks, their presence should not have been productive of disease among their comrades, advantageously located as they were.

The Royal Engineers occupied an old wooden-building, situated half a mile outside the fortifications, with the ground well sloped towards the sea in front and rear. Their duties were entirely day duties, not keeping guards, but employed

on the works. They participated in the immunity of the Naval-yard workmen, with whose duties theirs were analogous.

Among these two bodies of soldiers, dwelling a mile apart, the disease never assumed its epidemic characters, as was the case among the men of the 56th Regiment, quartered about midway between them.

While the Royal Artillery and the Royal Engineers, quartered on Ireland, suffered so little, *the soldiers of the 56th Regiment* stationed there presented these per centages :— Attacks to strength, 18· ; mortality to strength, 6·3 ; mortality to attacks, 35·5 ; indicating a very high degree of epidemic intensity, and a severe type of disease.

This portion of the garrison had two quarters, the smaller being a guard-house over the convict establishment on Boaz Island, where the earliest cases of yellow fever displayed themselves, and it is noticeable that up to the 1st October, that guard-house had sent to the Naval Hospital the only malignant case which had then occurred among the men of the 56th Regiment.

The main station of the 56th Regiment was the casemate barracks, within the outer walls of the fortifications, on an elevated site overlooking the Naval-yard. All the evidence adduced combines in condemning the sanitary arrangement of these barracks during the epidemic.

Captain Lacey, who commanded the garrison, describes them as "a long block of buildings, running from north-east to south-west, screened on the north-west and south-west by the fortifications, the walls of which, on the south-west, approach to within nine feet, and rise to equal height with the building :—a very imperfect ventilation is the consequence." "On the north-west, adjacent to the barracks, is a privy for the men, that taints the atmosphere of the barracks." "To the north-east is a privy for the officers almost equally objectionable."

These privies have been thus described by Mr. Anderson, the Admiralty engineer :—

"A hollow shaft about fifty feet high, and averaging about twenty-four feet by four, or ninety-feet of section, conducts the soil from the top of the rampart to an open ditch, leading to the sea. The shaft is always filled with the most noisome gases, continually escaping, and the ditch with the decomposing soil. The whole surrounding atmosphere is affected."

This most prejudicial state of things was specially represented in the report of the Sanitary Commission, dated 12th

September. On the 31st December, after the cessation of the epidemic, Deputy-Inspector Hilditch reports, "This evil has been from time to time brought under the notice of the authorities, and measures are NOW being taken to put an effectual stop to it."

In barracks with nuisances of this kind attached to them, the cubic space allowed each man, in this *quasi* tropical climate, was, according to the evidence of Captain Lacey, "380 feet in the upper rooms, and 288 in the lower or ground floor; the greater space in the upper rooms arises from their being vaulted ceilings, and more lofty."

To which Mr. Anderson's evidence adds, "I perceived in these barracks that each alternate room on the upper floor had a well-hole and staircase communicating with the room below."

To dwell in this over-crowded manner in apartments so ill constructed, under atmospheric influences from without of the nature described, must be under any circumstances productive of disease; and the more so where the temperature of the summer months maintains a standard of eighty degrees, and there is liability to an epidemic disease, of which a chief characteristic is its tendency to concentration in insalubrious localities.

From changes in the distribution of the men in the course of the epidemic, it is difficult to fix some of the data connected with its outbreak and course, but as clearly as I can trace, they are as follows:—

The cases of fever that had occurred in the casemates before the 7th Sept., the first being dated 28th August, were of mild type and short duration. On that day there was a remarkable increase of disease—eight men were taken to hospital; three of these were designated fever, one dysentery, one diarrhœa. To the end of the month, a bad state of health prevailed in the regiment. In August only five admissions from it into hospital had been made, but in September the admissions amounted to forty-five, and the deaths by fever to five out of twenty cases. Mr. Wells, Assistant-Surgeon of the hospital, has testified that three of these fatal cases had contracted fever at St. George's, and two at Hamilton. Accepting his assertion, it follows there was up to the end of September none but the mild type among the men in the casemates.

On the 29th Sept., thirty-three cases of fever of the 56th Regiment, from the military hospital at St. George's, were received into the naval hospital at Ireland. These cases are

described by Surgeon Innes, who sent them from St. George's as "subjects requiring the most assiduous care, on account of their precarious condition."

Deputy-Inspector Hilditch, who undertook their charge, reported them thus: "All of them labouring under the most severe form of the disease, nearly the whole of them in a complete state of jaundice, three having sloughing ulcers with active hæmorrhage, requiring constant attention, and five with extensive abscesses."

In the same document, dated 30th September, he stated, "Up to this date the disease has not become epidemic in this island. Mild cases of fever are dropping in, one or two at a time, and at intervals of two or three days."

It appears that subsequent to this importation of cases of an adynamic type, complicated with the worst sequelæ, new characters were developed in the disease on Ireland Island. The epidemic spread within the confines of the naval hospital, as already shewn. Dr. Hilditch reports, "Finding that the nurses, some of the surgical patients, and the medical officers were attacked by the disease, as if it had become communicable, it was deemed prudent to discharge all the military patients who had not as yet suffered from the epidemic, and send them to Ports' Island."

Captain Lacey, whose evidence has been already quoted, states, with reference to the reception of these fever cases from St. George's:—"Several of the men employed on the duty of landing and conveying the patients were attacked with the disease and died, and from this moment it seemed to gain ground in the casemate barrack occupied by the 56th."

The hospital records shew that between the 29th September, the date of that occurrence, and the 8th October, seven cases of fever were admitted from the 56th Regiment, of which one proved fatal. From the 8th to the 15th no admission from the casemates took place, and on the latter date the epidemic broke out there in all its intensity, so that of the next ten cases admitted seven proved fatal.

On the 21st November there was a sudden cessation of admissions, and after that date only one primary attack is met with, on the 9th December, ending in recovery.

It is an interesting feature that the malignancy of the attacks was maintained to the cessation of the epidemic. There were six deaths in the ten cases last admitted up to the 21st November.

The period of epidemic intensity is thus accurately defined to have been from the 15th October to 21st November.

The statement of Captain Lacy is, "That the sufferings of the troops here were entirely dependent on the removal of the sick from St. George's."

On inquiring, I have been informed that the duty of conveyance of the sick rested with the St. George's garrison, and that the men thus employed were subsequently dispersed to various encampments distant from Ireland.

It is possible that before leaving the island they may have mixed with their regimental comrades stationed there, but proof is wanting that those comrades, who suffered grievously after this event, had any personal contact or near approach to the sick.

It seems to me that that opinion would have been almost incontestible, if the subsequent disease had formed a continuous series; but with the fact of the absence of fresh fever cases between the 8th and 15th October, I think that some other causes must have been directly influential in producing the outbreak on the 15th October.

I am quite unable to arrive at any conclusion as to the exact nature of these causes; but I think that whatever were the excitants of such activity, they were connected with locality rather than inherent in the systems of the men congregated in that locality. When epidemic intensity was once fixed there, improvements of the subsidiary causes (over-crowding, bad ventilation, etc.) were insufficient to check the spread of disease within that locality, although the sick were not kept one hour in it, but were sent to the hospital.

With regard to the over-crowded state of the barracks, strenuous efforts were made to remedy that defect, and on the 27th September, seventeen days before the malignant epidemic outburst, eighty non-commissioned officers and men were removed from the casemates into a large new building (affording six hundred cubic feet to each occupant) in the Naval-yard, thus leaving nearly one-third more cubic space per man to those who remained in the casemates.

After the epidemic intensity had pronounced itself, this space was still further increased by sending one hundred men to Tucker's Island on the 24th October, and fifty more on the 25th, thus leaving less than one hundred men in the barrack usually holding three hundred, among which diminished number the disease continued for four weeks longer, to develope itself with undiminished intensity up to the moment of its sudden subsidence on the 21st November.

Indeed it appears to me difficult to adduce any stronger instance of the power of *localisation* appertaining to this disease in its epidemic form than this, and more especially when known that one hundred and fifty men, removed thence after the epidemic outburst, did not carry with them to Tucker's Island any of the so-termed specific germs; inasmuch as after going to that locality, where they dwelt in tents, three cases only of fever occurred, *being relapses* in the persons of convalescents sent there from the naval hospital and Ports' Island, by which the original detachment was in no single instance affected.

From this it may be inferred, that if circumstances had admitted of the timely removal of the whole body, instead of a part, into that new locality, no further losses would have been sustained after the 25th October.

Another exemplification of the force of this fundamental principle in the treatment of communities of men suffering epidemics of yellow fever, viz., "*immediate removal from the locality in which they have begun to suffer*," is to be found in the history of this epidemic among the other division of the 56th Regiment, quartered at St. George's, as recorded by Surgeon J. H. Ker Innes. In it the epidemic commenced on the 31st August, and terminated within the first week of October. On the 13th September the infected regiment, having already suffered one hundred and five attacks and nine deaths, marched to an encampment at Ferrypoint, a distance of five miles, leaving its regimental hospital in St. George's. On the march fourteen men were returned to the regimental hospital, many to die; and up to the 21st September, the cases returned to hospital retained a high ratio to strength, after which date they declined to the end of the month, and but few new cases presented themselves after the first week in October at the Ferry Camp.

In the meantime the mortality among the sick in the hospital at St. George's ran very high. The number of cases being in excess of the accommodation, the atmosphere of the hospital became a source of infection so that none could enter the wards with impunity.

"Medical officers, whether of European or of Native blood, were attacked. One of the former died. Two-thirds of the nurses were attacked, and one-third fell victims. Of a detachment of eighty-eight men employed in carrying the sick, cleansing the hospital, and burying the dead, sixty-four were attacked, and thirty-four died.

"Most of the Europeans who remained in town were attacked, and numbers of them were dying. Under these

circumstances it was determined to sweep away the entire hospital establishment. Thirty-three of the worst cases were sent, as already reported, to the naval hospital on the 29th September, and the remainder to Ports' Island, the dying being left at St. George's."

"The removal was attended with signal benefit to the sick. Of the thirty-three worst cases sent to naval hospital only eight, and of about forty milder cases removed to Ports' Island, only one died."

The Commissioners on this epidemic reported their opinion, "That this removal of the troops from their barracks appears to have been attended with the most beneficial effects."

These results were less perfect than in the instance of the removal from Ireland Island, which was carried out immediately on the outbreak of the disease with epidemic intensity. But by this difference of results we are taught only the more strongly the absolute necessity not to delay under similar circumstances.

In the one instance, as the consequence of removal from the infected locality, there was immunity; and, in the other, signal benefit, even to those already fearfully stricken. In both instances, those who remained on the spot continued to suffer. Thus, at Ireland Island, "the cases in the remaining force shewed no diminution for nearly a month afterwards, and the disease appeared to gain in intensity and become more virulent."

And with reference to the state of St. George's subsequent to the removal of the 56th Regiment, Dr. Innes writes, "Had no removal taken place, I believe that, from the intense localisation of the ferment at St. George's at and after that period, two-thirds of their number would have fallen victims to it."

Deputy-Inspector Hilditch, writing on the state of the town of St. George's and of the effects of the withdrawal of the 56th Regiment, stated—"The effect of removing the troops from St. George's was certainly to check the extension of the disease among them; but those troops left in the forts in the neighbourhood of the town began to suffer in a greater degree than they had previously done, and the mortality among them became very great." By which statement the opinion is corroborated that if the 56th Regiment had remained in its old quarters, it would have endured still greater sufferings and losses.

The Convict Establishment, or rather the head-quarters of it, stationed for the works connected with the Naval-yard,

would have suffered much less in this, relatively to former epidemics, if the hospital-ship to which they were removed had not become a centre of infection, fatal to the sick of other diseases and to the attendants on the sick.

Dr. Hall, the Medical Superintendent of Convicts, has stated, in evidence, that of ninety-one fatal cases on board the hospital-ship, fifty-five originated there; and only thirty-six were brought from without. Without these hospital calamities, the establishment would indeed have presented most satisfactory results both in regard to ratio of attacks to strength as indicative of the extent of epidemic, and in that of deaths to attacks, as indicative of the severity of the disease.

Since the date of the last yellow fever epidemic, the accommodation of the prisoners had been altered. In lieu of 1045 men kept in three frigate convict-hulks, there were about 1000 men hulked in a line-of-battle ship and a frigate; while about 400 men were housed on Boaz Island, in newly-constructed buildings. In the ships the cubic allowance was about 250 feet; at Boaz Island it was 317 feet.

All cases of disease originating in either of these prisons were at once forwarded for treatment to the "Tenedos" hospital hulk, where the regulated space for each bed was less than 250 cubic feet.

In as far as the prisons for the convicts in health were concerned, there was a marked advantage gained; but as regards the sick, there was a deterioration of circumstances equally manifest in the loss of accommodation in the naval hospital, which they had enjoyed in the epidemic of 1843, where the regulation allowance to each patient had been on the average 700 feet.

Convict Establishment employed on Naval Works.

Strength on books immediately before the epidemic outbreak.	No. of persons victualled.	No. of attacks.	Percentage to strength.	Deaths.	Percentage to strength.	Percentage to attacks.
1843. 1st August.*						
Total Establishment.....	1045	768	73·4	83	7·94	10·8
1853. 9th July.†		Treated in Roy. Nav. Hospital.				
Working parties	1221	288	23.6	33	2·7	11·5
Sick in hospital	241	180	74.7	55	23·	30·5
Total establishment	1462	468	32·	88	6·	18·8
		Treated in the Tenedos.				

* From Governor Reid's pamphlet on Yellow Fever.

† From Commission of Inquiry, 1856. Evidence of Dr. Dickey.

In this it is exemplified that the intensity of a yellow fever epidemic may be greatly magnified by bad accommodation afforded the sick; and further, that on such occasions, unless the sanitary arrangements as to space, etc. be complete, it is injudicious to crowd yellow fever cases among the patients debilitated by other diseases.

In 1843 the attacks in the hulks were in higher ratio; by removal to a land hospital the ratio of mortality was kept low.

In 1853 the reverse is exhibited. The attacks in the hulks being low, the percentage of deaths was doubled by removal for treatment, to a crowded hulk hospital.

This unhealthy condition of the hospital hulk, whether dependent on a mere aggravation of persistent causes in the ship herself, or on direct emanations from the sick of fever, displayed itself in a fever epidemic affecting three-fourths of the people in her, and terminating fatally in thirty per cent. of attacks. No parallel to this can be found in the history of this epidemic, except in the convict hulk "Thames," at St. George's. So long as professional opinion is divided, this extreme instance will afford to those who advocate the doctrine of the direct contagion of yellow fever by specific germs, a strong case in favour of their views; while those who, without going so far as to consider it a disease propagated by emanations from the sick only, believe that it becomes infectious under intense secondary causes, will take these results for proofs of its contagiousness in that manner.

I entertain the opinion that the great mortality of the cases in the convict hospital arose from an infected atmosphere, produced by emanations from the excreta of so many sick crowded together amidst most unsanitary conditions, until the climax of epidemic intensity was arrived at—the disease being characterised by a copious excretion of diseased blood corpuscles.

But with such probabilities in favour of that side of the question, it will be interesting to trace the antecedents, circumstances, and progress of the epidemic in the hospital-hulk, which I shall now attempt to do from the evidence in possession.

The "Tenedos" had been used as a convict hospital since the 1st June, 1848, five years. It is reasonable to suppose that during that time deterioration of her wooden walls, as well as accumulation of débris in her lower holds, had been progressive. When she was abandoned three years later, in

1856, on account of her very unsanitary condition, it was found "that thirteen of her iron tanks were leaky, several of her timbers were rotten, and there was an accumulation of mud in her holds.

The capacity of all her decks, crowded with sick, including the low and badly-ventilated orlops, did not exceed 63,000 cubic feet. Her regulated accommodation for 253 persons afforded about 250 cubic feet to each. At one period of the epidemic she had on board 260 prisoners, of whom 170 were confined to bed, thus diminishing that very deficient regulated allowance.

As early in the season as 15th June, in consequence of the prevalence of *malignant cholera* on board the "Tenedos," it was recommended that cases should not be sent to her from the "Thames," at St. George's.

On the 9th July, the first case of fever proved fatal on board her with *jaundiced surface.*

Up to the 29th August, 120 fever patients had been received, of whom five had died. On that date Dr. Hall requested that the convalescents might be taken from the hulk into a building on shore.

About the 10th September the disease began to extend among the patients; and a little later, the nurses and labourers began to fall.

On the 14th September the first death with *black vomit and jaundice* occurred on board her. The victim had been on board as a patient for dysentery ten days before the commencement of the fever. The first case of black vomit seen in the hospital was in a man under treatment, on the orlop deck, for some other disease.

After the 15th October such cases were less frequent, this change for the better coinciding pretty nearly with the time when the epidemic assumed its intensity among the troops in the casemates—another most unsanitary locality, between which and the "Tenedos" there could not have been any intercourse whatever.

While recognising the weight of this instance to be in favour of actually contagious properties inherent in the disease, or added to it by causes within the hospital hulk, yet it seems to me that the evidence may be fairly stated thus:—

A hulk ordinarily very crowded with sick, was on the occasion of an epidemic still more over-crowded with fever patients. The epidemic gradually intensified in her until at length the highest degree was arrived at.

The first fatal instance of that highest degree (*jaundice and black vomit*) on board her, was not admitted as fever, but took on that type subsequently, after the impression of causes operating within the ship.

The residents being either predisposed by sickness, or the attendants, whose duties detained them much where the development of the epidemic was most active, were stricken until no more susceptibles remained.

The epidemic fixed itself early in the hulk, where very insalubrious conditions prevailed, grew up there and acquired its worst characters, worse in degree, without differing in kind. It may thus seem to some less necessary to assume any new or special action or mode of communication to have been in operation, to account for the phenomena, than in the case of the naval hospital, or in that of the casemates.

In all these three there were analogous conditions:

1st. Defective sanitary states, such as ill ventilation and imperfections of drainage in all, and great over-crowding in two instances.

2nd. Disease and mortality far above the average ratios.

1856. This epidemic was of less extent and of milder form than the two great visitations immediately preceding it. It resembled those of 1837 and 1818 in its limitation to the western half of the group of islands, and that of 1796, in its having originated in the more sparsely peopled rural districts.

With regard to its origin the usual suspicion of importation was not wanting.

The suspected sources were:—

Suspected ships.	From which place.	Yellow Fever on board.	Dates at Bermuda.		Received pratique.
			Of arrival.	Of departure.	
H.M.S. Argus	Jamaica	Yes	30 March	23 April	Not
„ Malacca	Do.	Yes	4 June	28 June	Not
Margaret Musson..... *Merchant Schooner.*	Demerara	No	28 July	Remained	At once

After this epidemic, as after that of 1853, a commission of inquiry was formed with the medical element superadded to it, to investigate the facts of the epidemic, and the following conclusions were arrived at by it:—

1st. That the epidemic of 1856 originated in this colony.

2nd. That it made its first appearance, not at one, but at several points distinct and widely separated.

3rd. That it did not spread through contagion or infection.

4th. That quarantine should be applied to ships with yellow fever, and not to the crews of such ships.

In exposing the fallacy of the attempts to attribute this epidemic to introduction from without, this commission dwelt on the inconsistency with which the advocates of importation had fixed on the "Margaret Musson," as the source of contagion in the earliest case, after the lapse of eight days from her arrival, with an absolute want of proof that the ship had ever had the disease among her crew; while they ascribe the importation in another locality to H.M.S. "Malacca," in a case that occurred forty-seven days after her departure from the island; thus imposing a stage of incubation varying from eight to forty-seven days on like phenomena of disease that broke out within five days of each other, in two cases of presumed contagion.

Such inconsistency was judged by the commission sufficient to remove all fair ground of suspicion that the disease was introduced from without.

Although this epidemic differed in some points from the greater epidemics, yet there was not wanting in it the important feature of coincidence with disease in the United States, and in the occurrence of the preceding sickly spring and summer seasons with the usual forms of zymotic diseases.

The distinctive peculiarities were chiefly—

1st. Its local distribution in the western half of the islands around the shores of the Great Sound, as in 1818 and 1837, when, as on this occasion, St.George's almost entirely escaped.

2nd. Its points of outbreak being in rural districts, near muddy creeks on the sea shore, and not in the midst of the most crowded communities.

The dates of these outbreaks at various points were:—

No. 1, 5th August, Somerset Island, near the bridges connecting it with Grand Island, where two deaths occurred on the 11th August; No. 2, 8th, Hamilton parish, a fatal case; No. 3, 10th, Turtle Bay, midway between Nos. 1 and 2; No. 4, do., Devonshire Marshes, midway of Nos. 2 and 3; No. 5, 18th, Ireland Island dockyard, no other case for days—first death on 28th October; No. 6, 23rd, Convict Establishment in hulks and in succession, 9th September—"Thames" hulk used as fever hospital 13th September, Boaz Island prisons 20th September, "Tenedos" hulk used as a

general hospital; No. 7, 5th October, Ireland Island soldiers in barracks, on which the whole force was sent to sleep at night in two distinct widely separated camps, in one of which the next case was shown on the 23rd October, and in the other on the 2nd November.

The course of this epidemic in Ireland Island is interesting, shewing a difference of results in many important points from those of 1853, especially in these facts, "that the Dock-yard population, which had almost an immunity in 1853, suffered more on this occasion, while the troops which bore the epidemic badly in 1853, were nearly exempt in 1856."

Localities on Ireland Island.	Mean strength.	Total attacks.	Ratio to strength.	Deaths.	Ratio to strength.	Ratio to attacks.
Naval yard.						
In the square of oldest houses	120	50	41·66	5	4·16	10·
Remaining population	305	55	18·03	2	·65	3·65
Total establishment	425	105	24·00	7	1·41	6·66
Hospital.						
Admitted with other diseases	62	15	24·2	4	6·45	26·66
Total fever cases	...	76	...	7	...	9·22
Troops in garrison.....	353	29	8·2	1	.28	3·44
Convict establishment ...	1110	134	12·00	27	2.43	20·60

The details of this table find their best explanation in the fifth article of report of the commission, viz.:—"That in order to mitigate the severity when it may recur, the measures to be adopted, but to be adopted in anticipation, are sanitary measures, and that the advantages to be derived from such measures are incalculable."

In as far as the monitions of the inquiry of 1853 had been carried out in 1856, there was found to be great gain; but, wherever they were disregarded, from apparent difficulty in the way of their being carried out, or there was less energy in doing so from reliance on the degree of immunity previously enjoyed, there it was proved, by fresh examples, that in yellow fever epidemics the advantages to be derived from well-timed sanitary measures are indeed incalculable.

Thus it is shewn, that among the people of the *Naval-yard* the epidemic was trivial in its proportions and features, possessing malignancy only in one spot, where there remained a collection of the oldest houses, "too much hemmed toge-

ther, and too small where the families were at all large, with bad sewage, etc. (as described by Deputy-Inspector Rees) standing condemned for removal, but untouched when the epidemic came." "To this quarter," quoting the same authority, "the disease may be said to have adhered obstinately during almost the entire epidemic."

In the *Naval Hospital* the worst zymotic characters were again displayed, as is shewn in the number of attacks and the mortality among the patients in hospital, with other diseases than yellow fever; nor was there any check put to this liability previous to the abandonment of the wards as a general hospital.

The naval hospital records shew that about the middle of October fever cases became numerous (although not severe in character) among the admissions.

On the 29th October a patient was admitted from the Naval-yard, who died on the third day after admission.

On the 1st November an officer from a ship lately arrived was admitted, and he died on the fourth day.

Black vomit was present in both.

Subsequently to this, although there were but few patients in the hospital, several of these were attacked. The epidemic that was declining everywhere else, was increasing here, and it retained its productive force to the 10th December, when a surgical case that had been in hospital from the 28th November, was suddenly seized, and died with black vomit on the 12th December.

The disposition to spread was then excluded by removing all but fever patients into another building, thus converting the main hospital into a fever hospital.

In earlier epidemics there had been more or less of this tendency displayed, but not too large to be ascribed to the epidemic conditions generally prevailing in Ireland Island at the time.

Among the families connected with the hospital, numbering about thirty individuals, there were seven cases, and no death, which proves that the epidemic intensity was confined to the wards.

The Garrison on Ireland in 1856 exemplified in the strongest manner the value of anticipatory measures, by a comparison with 1853, when the disease in all its intensity stuck to the inhabited barracks from first to last, producing great losses in them.

On the present occasion, on the very first announcement of the yellow fever, a large number of the troops were put

under canvas at night, and immediately that a case appeared in barracks all the men were encamped; and as soon as a case shewed among them there, the camp was shifted. By these means the infantry, 296 in strength, presented only twenty-eight attacks and no deaths, and among the remaining force there was only one attack in a boy, who died.

In the Convict Establishment, with the view of providing against the terrible conditions of the hospital hulk "Tenedos," in 1853, a separate hulk, "Thames," was prepared as a special fever hospital, but it was found that the fever having once commenced there progressed rapidly in both these hulks.

The hospital establishments were then moved to the island with most marked benefit, although occupying buildings wherein cases had previously originated.

In hospital hulk.	Date of epidemic outbreak.	Before removal.			Date of removal from hulk.	After removal.			Date of cessation of epidemic.
		Str.	Att.	Dths.		Str.	Att.	Dths.	
Thames	Sept. 9	40	19	4	Oct. 8	21	3*	0	Dec. 13
Tenedos	„ 20	120	32	11	„ 22	102	11*	1	

Eight of the cases after removal, including the fatal case, may be said to have originated on board the hulk, as they occurred within four days after the removal from her to the shore. That much of the fatality on board the "Tenedos" arose from local causes, is well supported by the fact that while those removed suffered so little afterwards, "of six men who volunteered to remain on board her as a guard, four speedily took fever and died." Mr. Edwards, the chief medical officer of the convict establishment, attributed this unhealthiness to conditions discovered on cleaning the holds, when it was found that thirteen of her tanks were leaky, there was an accumulation of mud in the hold, and several of her timbers were rotten.

Such facts as these, together with the history of the same vessel in the epidemic of 1853, are of themselves powerful reasons against making *stationary ships* the receptacle of the sick of yellow fever.

During this epidemic the ships of war at the anchorage afforded instances, curiously shewing how very differently the crews of ships may suffer in infected localities.

H.M.S. "Nile" remained at anchor off the dockyard throughout the epidemic, and held free communication with the shore. She sent no case of fever to the hospital in that

time; but a case of scrofula sent took yellow fever there and died.

H.M.S. "Basilisk" arrived from Halifax on the 13th November Her more susceptible, because unacclimatised, crew suffered at once from the morbific causes. Within a few hours of her arrival, there was a case of fever on board her, and two more on the fourth day. These were considered "cases of ephemeral fever, partaking in a slight degree of the characters of the prevailing epidemic." Up to the sixteenth day there had been nine cases of fever sent to hospital from her; one of those sent on that day had well marked symptoms of yellow fever. On the 7th December, a case of it that terminated in death was sent from her, this being the last fatal case of the epidemic treated in the hospital.

H.M.S. "Boscawen" arrived from Halifax also on the 27th November. She sent to the hospital at once a case of ordinary disease of fifteen days' continuance and a case of suicidal mania, both of which died with black vomit. No case of yellow fever originated among her crew on board her.

The only ostensible reasons for this difference of susceptibility, as far as I can see, are that the "Nile" was acclimatised amid the growing epidemic causes; affording no local causes of development, she escaped. The "Basilisk" arrived when the epidemic causes were active generally through Ireland Island: the "Boscawen" when they were limited in action to the naval hospital.

Having thus brought under review the most striking features of the epidemic visitations of yellow fever in Bermuda, I will now give a summary of the results which I conceive to be fairly deducible from this investigation.

1. That, in the best recorded yellow fever epidemics of Bermuda, there has been generally coincidence of the same disease on the American coasts, without proof of transportation.

2. That on such occasions there has been an *epidemic constitution* displayed by catarrhal affections in the spring, and by gastro-hepatic disorders in the early summer, yielding to fever, which, at its climax in the autumn, has assumed the type of "*yellow fever*, with *black vomit*" in a greater or less proportion of the attacks.

3. That, during these epidemic seasons, comparative immunity has usually favoured the native population, and those of the European inhabitants dwelling under good sanitary conditions.

4. That the most intense manifestations have arisen in crowded barracks and convict hulks, especially where the healthy and sick have been kept together; and most of all where the sick of yellow fever have been treated in hospitals, among the infirm of other diseases.

5. That inasmuch as, in the worst instances recorded, it has been found that removal from infected localities has been followed always by an almost complete exemption of those not already infected, by amelioration of the state of the attacked, and lastly by an early extinction of the epidemic character of the fever, it is therefore just to consider the *essential causes* of the disease to operate, under ordinary circumstances, by *material local agencies* rather than by *those of person.*

6. That sanitary measures are the means to be relied upon in the approach of the epidemic constitution in any locality.

7. That, in the event of epidemic outbreak, the same means are highly valuable; but the only measure of certain value, then, is removal from the locality, and in case of crowded communities, as in barracks or ships, immediate dispersion into wider space of all men within the range of the noxious local elements.

8. That, although the direct proof of *personal contagion* may be still wanting, there are ample reasons for concluding that the highest degree of *local infection* has been generated in the hospitals, naval, military and convict, so that the malady has been propagated among the attendants as well as among the sick.

9. That, with regard to hospital arrangements for the treatment of yellow fever, owing to the peculiar predisposition arising from the debility of ill-health, yellow fever hospitals should always be distinct and special, and under *sanitary cordon.*

10. That in the treatment of the disease much depends on allowing the highest scale of space, for respiration and for diffusion, allotted to the sick in well regulated fever hospitals; and considering the disadvantages of this climate, the minimum space, even where perfect ventilation can be maintained, should not be less than 1,500 cubic feet per man in fever wards.

After this resumé of theoretical and generally practical principles, which I consider developed out of this inquiry, I may now proceed to dilate more at large on a few points that have struck me as of value, particularly as concerns the naval and military services.

The importance of any elucidation of the laws of origin and propagation of these epidemic diseases to those departments of state that maintain establishments here, and above all to every member of those establishments, is to be estimated by statistical comparison, as far as reliable material can be obtained, of the effects of these diseases on the troops, civil establishments, convicts, and native population. Before the effort of Sir William Reid, in 1843, to collect facts and evidence, there was nothing of a statistical nature to be relied on.

The following table is compiled from his pamphlet and the reports of the later commissions:—

Year of the Epidemic.	Government Establishments.									Native Population.		
	Troops.			Dockyard.			Convict Estab.			Last Census.	Att.	Dths.
	Str.	Att.	Dths.	Str.	Att.	Dths.	Str.	Att.	Dths.			
1843...	1500	1100	193	444	162	11	1358	1034	113	No returns.		
	Imperfect.											
1853...	1517	839	360	419	29	0	1778	679	161	11,092	...	138
1856...	1326	42	4	420	105	7	1113	109	30	ditto	1080	85
Totals	4343	1981	557	1283	296	18	4249	1840	304	22,184	...	223

AGGREGATES.

	Strength.		Deaths.		Percentage of deaths to population.
Troops	4,344	...	557	...	12·5
Dockyard	1,283	...	18	...	1·4
Convict Establishment	4,249	...	304	...	7·1
Total Government Estabs.	9,875	...	879	...	8·9
Natives	22,184	...	223	...	0·1

From this table it is to be inferred that the exaggerated liability to disease and death in the different establishments, by comparison with that of the native population, is dependent on removable causes, because one division of the employed by government, those of the dockyard, show an aggregate percentage of 1·4; while another, the troops, present one of 12·5.

With such a strongly marked difference of results among bodies of men sent from the same country, it is reasonable to look for some widely-acting cause affecting the vital phenomena in those who suffer in the highest degree. It seems to me that no merely personal causes would effect so much; and I conclude it must be something general, which I am disposed to attribute in great measure to the house accom-

modation. Among the dockyard population, each family has a separate well-fitted residence, while troops have been too much crowded in their barracks, breathing a vitiated atmosphere there, and reproducing those secondary causes required for the development and extension of this fever epidemic.

The assumption of so simple a cause, as one almost co-efficient with the theoretical specific poison, finds some confirmation in what has been seen to result from the removal of troops from infected barracks and hospitals into the open air to dwell in tents. Guided by experience of the value of these simplest of sanitary measures, it is scarcely probable that similar calamities will ever recur in this garrison. And this experience may be made of still wider application; for if it be proved, as I believe it has been, that yellow fever epidemics are generated within these islands in seasons when the epidemic constitution of that malady has co-existed on the American shores; and that, by certain conditions and measures, their intensity has been magnified, or, by the reverse, epidemics have been deprived of force; it follows that the same results are to be expected from the same conditions and measures in other localities wherein yellow fever may have been generated or acquired.

Everything concerning yellow fever bears a peculiar interest to the naval service, inasmuch as the invaluable medical statistics of the navy constantly exhibit the fact that, in all that relates to the prophylaxis and treatment of this, incomparably the worst, malady of our West Indian fleets, we seem to have advanced nothing during the century.

Ships are sometimes the foci in which the disease is conveyed from one point to another. Since the introduction of steam power, and the consequent alteration in their contents and stowage of vessels, together with the higher temperature maintained in them, by which decomposition is facilitated, the manifestations of this direful malady seem to have become more frequent, and, if possible, more devastating, notwithstanding the increased facilities afforded by steam of removal from the localities in which the malady has first affected their crews. In this fact, there is proof of ample room for further investigation into the local morbid causes within ships.

There is another point of high practical worth to be drawn from the history of these epidemics in Bermuda, viz., the difficulty of fixing the date of outburst of the several epidemics, from which there has been shown to arise remissness in having prompt recourse to sanitary measures. It

would appear that this has been from regarding one prominent symptom as alone pathognomonic of the epidemic constitution proper to yellow fever—"the exosmosis of altered blood corpuscles from the mucous surface of the stomach and their ejection under the technical name 'black vomit.'"

I believe it is wrong to assign this as the only pathognomonic sign of the existence of the epidemic poison, as the manifestations of that, like those of all other morbific causes, must vary in degree according to the stage of the epidemic, and the predisposition of individuals exposed to it. The error consists in assuming that to be essential which is only casual, and merely one indication of a general hæmorrhagic tendency, that may display itself on the mucous surface of the mouth; that of the fauces, the stomach, or of the large intestines, and also on the mucous surface of the urinary apparatus; or in the serous sac covering the brain; or that may be even altogether absent in cases of the congestive and inflammatory types of the fever—all of which is well displayed in the records of post-mortem inspections made in the hospital during these epidemics.

In studying these records, I have found at every stage of those epidemic visitations numerous instances in which the "jaundice" that gives the name of yellow to the fever, and the "black vomit," most frequently the final symptom, have both been absent in cases terminating in death, especially in the early and late stages of the epidemic, they being invariable concomitants only during the period of its highest intensity.

Adopting this view of the succession of morbid processes and phenomena, it is readily conceivable that the precursory cases described as cholera, gastric fever, dysentery ending in fevers—adynamic, bilious, remittent—are but minor manifestations of the commencing epidemic, forming the bulk of the earliest cases, and never absent, although relatively less numerous, when the epidemic causes have attained their climax, and even existing alone sometimes in favoured localities throughout an epidemic.

The history of the yellow fever epidemics of Bermuda elucidates the nature of those disorders marking their track from the earliest period, months before the presence of cases with jaundice and black vomit. The constant repetition of these precursors may be received in illustration of the law of growth of the epidemic constitution; and whenever or wherever they present themselves within the yellow fever zone, they should be accepted as the kindly and timely

monitors of prophylactic measures. In the case of ships warned by them, there can be only one measure to adopt—an immediate retreat, if circumstances will permit, from the locality in which the warning has been given. And should these indications have progressed to the worse degree, and have terminated in yellow fever, the abandonment, at the earliest practicable moment, of the ship, and the subjecting her material to thorough purification, before re-occupation, can be the only means of ensuring safety to any one of her crew susceptible of the morbific causes.

In closing these remarks on a disease which has of late been, not unworthily, dignified with the title of "pestilence," and which appears to have overleaped its formerly recognised boundaries;—scaling the mountains of Jamaica to attack stations founded on a calculation of being beyond its reach; penetrating, in the United States, to inland villages and plantations when, formerly, its ravages were confined to coast cities; displaying its productive power on Transatlantic shores as high as Nova Scotian harbours; and preserving its deadly traits in ships that have reached the shores of France and of England, where, too, it may be learned, at no distant date, that it has also retained its propagative forces;—I would express a hope that I may not be thought presumptuous, on the ground of want of personal experience of the disease treated of. My notes were compiled from various sources in studying the diseases of the station. They seemed to me conclusive on several points found of uniform occurrence, and to exhibit well many of the laws of the disease. My deductions and inferences from the facts recorded may or may not be correct. They have at least been governed by an earnest desire to seek the truth in this important matter; and if by this investigation I shall be judged to have succeeded in utilising the valuable records of the Bermuda hospital, in so far as the *yellow fever "pestilence"* is concerned, my efforts will be amply repaid.

ON THE EPIDEMIC DISEASES OF TASMANIA.

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(*Read April 6th*, 1863.)

Tasmania, an island nearly as large as Ireland, is situated between the 40th and 44th degree of south latitude. The general elevation of the island may be considered conical and mountainous; but the altitude of the highest mountains does not exceed 5000 feet. As yet, epizootic diseases have been almost unknown there. The pleuro-pneumonia, which has done so much mischief among cattle in Europe and America, and has been rather destructive in the Australian colonies, has not yet shewn itself in Tasmania.

The mean temperature of the three coldest months – June, July, and August—is about 47 degrees Fahrt. on the average of twenty years' observations. The greatest cold ever known during that period was 29 degrees.

The mean of the three hottest months—December, January, and February—is about 63 degrees. The highest recorded temperature in the shade is 105 degrees; but on the whole the thermometer rarely ranges about 90 degrees. The climate has only one drawback, viz., the frequent and rapid transitions of temperature.

A census was taken in 1857 and also in 1861. In 1861 the total population of all Tasmania was 89,977, of whom 41,649 were under twenty years of age. The sexes were on the whole nearly balanced, but there was a singular predominance of females over males at the ages of fifteen to twenty, owing doubtless to the rush of the latter to the Australian and Californian gold diggings. Tasmania had been colonised about fifty-seven years when the last census was taken.

An Act for the public registration of marriages, births, and deaths was passed in Tasmania soon after the English Act came into operation, near the close of 1838, under the governorship of Sir John Franklin. No official

tables of the "causes of death" have ever been compiled; and, until 1855, when I exerted myself to improve the study of vital statistics, the information given was meagre and of little value. I have for many years compiled every month a "health report" for the Hobarton registration district, arranging the particulars in conformity with the nosology and classification agreed upon at the International Statistical Congress held in Paris in 1855, and analysing the details in connection with the meteorological phenomena.

For some time past the medical practitioners generally have, at the request of the Registrar-General of Tasmania, instigated by me, furnished a return of the "cause of death" in each case attended, using the same printed form as in England.

The annual average of deaths from all causes in the Hobarton registration district in the five years ending 1857-61 was 602$\frac{3}{5}$, which gives a death rate of about 24 per 1000 per annum—the population in 1861 was 24,773. Contrasted with the rural death-rate of 12 per 1000, there is an enormous disparity, which cannot be attributed to any other causes than those which produce similar results in the cities of the Old World, viz., the neglect of sanitary measures. No city could have a more healthy and more advantageous site than Hobarton; but defective water supply, inefficient sewerage, cesspools, interment of the dead in the midst of the living, great disregard of ventilation, etc., existed during the period under review, and still exist, although I trust it will be but for a short time longer. In a few weeks, a water supply of incomparable purity will be in full operation. Measures have been also initiated for a thorough system of sewerage. Other sanitary defects, it is to be hoped, will be reformed sooner or later.

Of the 602$\frac{3}{5}$ deaths the *zymotic class* has the share of 136$\frac{4}{5}$, which is higher than usual, owing to the epidemic of influenza in 1860, of measles in 1861, and of diarrhœa and dysentery in children in 1858. The *constitutional class* has 90$\frac{1}{5}$; the *local*, 273; the *developmental*, 65; the *violent*, etc., 37$\frac{2}{5}$.

Small pox. The first disease in the miasmatic order of the zymotic class is happily so far unknown in Tasmania. Nevertheless, ships with passengers to this port have had deaths from this cause during the voyage, but it has never got a footing in this island. Should it ever do so, a large proportion of the population will be endangered, for vaccination has been much neglected.

Measles first visited Tasmania in the early part of 1854,

but how introduced was not traced. The only two diseases specially named in our Quarantine Act, passed in 1841, were small pox and measles. Previous to this disease breaking out in this island it had been scourging the Australian colonies, and its stealthy outbreak here proves how ineffectual the quarantine regulations were to prevent its introduction. In the Hobarton district it caused forty-four deaths, but twenty-seven of these occurred in the orphan school, where there was a daily average of 424 children, overcrowded, underfed, and otherwise hygienically mismanaged. Five out of six in my own family had an attack, under specially unfavourable circumstances, but without any fatal result, or injurious sequelæ. I was equally fortunate with all my patients. In 1861 measles was again epidemic from February to September. It had been ravaging the neighbouring colonies before, but the first case known at this time in Tasmania commenced in an inland district, and propagation from thence to this city was clearly traced; and the radiation of it from the house in Hobarton, where it began, was made quite evident. The deaths were fifty-five, and principally between the ages of one to ten. Two adults, however, died from it. The orphan school had again, notwithstanding many hygienic improvements within the previous two years, a very undue proportion of the deaths, *i.e.*, thirteen out of 316 children attacked in the institution, the ages being between three and fourteen. I was at that time one of the Board of Managers, and spared no pains to introduce a better mode of treatment than was adopted, but my suggestions were not carried into effect. Shortly before this time, the epidemic had attacked seventy children in an institution at Melbourne, where the climate is much less favourable to children than Tasmania, and there but one out of the seventy died of dysentery following the measles, at the season too, January, when bowel affections are always more or less prevalent in that colony as well as this. In a similar institution, near Sydney, out of ninety cases, there was not one death, though the disease in the community at the same time was comparatively much more fatal than in that of this island. The average of the deaths throughout Tasmania, above one to twenty years of age, for the four years of the series 1857-1860 was 274, while that of 1861 was 373; consequently, the measles epidemic may be considered to have augmented the mortality of 1861 by ninety-nine deaths. Supposing that all the children, upwards of seven years of age, had been attacked by the epidemic in the visi-

tation of 1854, there would be at least 19,400 children susceptible of the infection in 1861, and I do not think many of them escaped an attack. Out of those who were susceptible in the orphan school, 317, only one did not take the disease. There is certain evidence that measles was much mitigated in severity of type and comparative mortality by its visit to this island, from the form in which it prevailed in New South Wales.

Scarlatina first appeared in Tasmania, at least epidemically, in 1843, and no part of the island escaped its visitation. Through what channel it obtained admission was not ascertained. I was then stationed at an elevated and very healthy inland district, and though the disease was general in it, the type was mild, and no fatal cases occurred. In the Hobarton Registration District forty-three deaths took place, but eighteen of these died in the orphan school, and many more subsequently from dropsy, marasmus and other sequelæ of this exanthematous fever. In 1853 another epidemic visitation scourged the whole colony, but spared the orphan institution; it is believed by the medical officer then in charge, "from the strict quarantine established." In the Hobarton district the total deaths of that year were 994, out of which 230 were caused by scarlatina. Many families had to mourn the loss of more than one of their members. In one house, situate on the verge of the City Rivulet, which is practically the *cloaca maxima* of the city, and within a few yards of the house a mass of decomposing mud and other filth existed, a whole family of five children were swept off —three lying dead in the house at one time. The existing meteorological phenomena were, however, unfavourable during the prevalence of this epidemic. At that time I was on duty at the Invalid Station in Tatman's Peninsula, where two cases only occurred, both treated by me. One only was fatal, and that within twenty-four hours from my being called to see him. The patient was a boy of nine or ten years of age, and had been sent from the military barracks in Hobarton to the military station at Eagle Hawk Neck, to be out of the way of the disease, then so destructive in the city. In the sergeants' quarters, where he died, seven individuals occupied two small rooms, though otherwise the station was a most healthy one. I took active measures to prevent the spread of the disease in the detachment, and my efforts were crowned with success. The other case was also an imported one from Hobarton, and occurred at the Invalid Station, where I resided. The patient recovered, and my exer-

tions prevented the disease being communicated to the numerous children on the station. I used belladonna largely, as a prophylactic, both in my own and other families at this time, and subsequently in Hobarton, when I had cases in private schools under my medical charge. Deaths from this disease have occurred in four out of the five years, 1857-61, 1860 escaping. From time to time isolated cases have occurred ever since the first outbreak of measles, but the disease did not become epidemic. This I attribute to the generally favourable meteorological conditions, and free aerial movement, with abundance of ozone, which prevailed. In 1858, however, the disease for a time assumed a threatening aspect, while the meteorological phenomena were the reverse of what I assign as our safeguard. The orphan school had few cases, and one death. Three deaths from scarlatina have been registered this year up to the present date (23rd October, 1862); one for each of the following months—January, August, September; but the cases have been few and isolated, the meteorological conditions being favourable to health.

Diphtheria. This novel disease was first observed almost simultaneously in two inland districts of this island, in the month of January, 1859. In the *Australian Medical Journal* of July, 1859, there is an article on this disease, as it existed in New Norfolk, one of those districts, by an old resident medical practitioner, John A. Moore, Esq. The first deaths in Hobarton were two children, brought to the city for medical treatment, from Oatlands, the other country district alluded to, about fifty miles off. In the same family two other children had previously died there with the disease, and three of their cousins. The next death in this city occurred in April, though it was registered as from croup. The fourth, a young lady of eighteen, was a well-marked case, which removed all doubt as to the nature of the affection which had existed in the three first cases, in the opinions of the medical attendants. A direct communication between the two first and the fourth individuals was traced out. From that time numerous cases have occurred. In this year a case here and there is constantly coming under treatment, but the disease does not assume an epidemic character. I have traced communication, however, between patients attacked, though living far apart in the city. The deaths so far have been three in June, two in July. This disease hitherto has not spread much among the members of any household in Hobarton where it has broken out. Single cases frequently occur without the disease being communicated to other

members of the family. In the first case I had to treat, the servant who attended to the young lady caught the disease, but her mother and two sisters escaped. In the two country districts where the disease first made its appearance, in many cases all the children in the family were infected. I have found the disease readily amenable to treatment, when seen at an early stage. Nourishing diet, with sesquichloride of iron internally, and dilute hydrochloric acid locally applied, have never failed in my practice to produce restoration to health.

Quinsy I may pass without comment.

Croup, as the mortality shows, is a very fatal disease in Hobarton. I never had a case to treat in any of the country districts I have been in, though nineteen out of the twenty-nine years of my practice in Tasmania have been in various widely-separated rural districts. Many of the cases I suspect, since the time that diphtheria commenced, have been erroneously registered. Hobarton, it must be observed, is subject to greater sudden variations of temperature than most other places in the colony, which is accounted for by the proximity of Mount Wellington.

Whooping Cough was first observed in Tasmania as an epidemic in 1842, and at that time spread throughout the island. But I find in the Hobarton Registry a death ascribed to the whooping cough in August, 1840. In the epidemic of 1842 I was living in one of the healthiest country districts, forty miles from Hobarton, and caught the disease from a child I was attending, though I had gone through it in early life. This child had been sent for change of air from a district near to Hobarton. I communicated the disease to every one of my own children, and it spread every where. Isolated cases have ever since this year occurred, and in several years it has assumed an epidemic character. In the last four months of 1855, the Hobarton Registry gave thirty-one deaths from whooping cough, though not a single death had been recorded from this disease under three years of age for the previous four years. As usual, the orphan schools had the lion's share—seven out of the thirty-one deaths. Only one death, it will be observed, took place in 1857, and none in 1861. This year one occurred last month, and the disease is at present assuming a threatening aspect, and no doubt will become epidemic should unfavourable meteorological phenomena arise—1858 was so charactised.

Fever. I have included all the cases of fever (with the ex-

ception of the exanthematous and rheumatic, and metria) under this general title, as the registered distinctions are vague and unsatisfactory. The fifty deaths in the table give an annual rate of ten per annum on 25,000 persons, or 400 per million, which is about 500 per million less than the London rate, and seven per 100,000 below the rate for all England and Wales. There is no fever peculiar to Tasmania.

Ague is unknown.

Typhoid Fever occurs where the local defects of sewerage, accumulations of filth, etc., can engender it. We are not without many such peccant spots in this city, but in the country fever is a rarity. I must, however, except the Queen's Orphan Asylum, which, though enjoying every advantage of site, has always been a nest of this form of fever. At the very time when inspected by a commission of inquiry (which I had been agitating for years), no less than eighteen out of 153 girls, six to fourteen years of age, were then under treatment with a severe form of typhoid fever, though all escaped from death. Sanitarians will feel no surprise that this should have been the case, even in this anti-febrile climate, when I state that the privies were within the building, that the sewers conveying all the refuse of the establishment (latrine contents included) passed beneath the building, and gratings connected with them, gave vent to the gases in a cellar at the foot of the dormitory staircase, etc. At the same time the cubic breathing space for each child was far too small, and the food allotted not half sufficient. Most of these defects have since been remedied, and other improvements are in progress. Out of an annual strength of about 450 children, mostly three to fourteen years of age, the average of nineteen-years deaths was nearly sixteen per annum. In the three years since the food was increased and other improvements commenced, with an annual strength of 465, the deaths have averaged not quite half so many, though thirteen out of the twenty-three resulted from the epidemic of measles in 1861. So far this year (October 23), no deaths have occurred in the institution. The death-rate for children of the same ages and number in country districts is less than three per annum. I have therefore some fruits to show as the result of my persevering endeavour for many years past to reform the sanitary condition of this interesting charity, notwithstanding the bitter opposition I have encountered. The end is not yet.

Cases of Fever returned in all the Public Establishments, General and Convict Hospitals in Tasmania, from 1844 *to* 1861, *inclusive.*

	Cases.		Deaths.
1844	247	...	14
1845	177	...	10
1846	196	...	3
1847	259	...	6
1848	201	...	8
1849	104	...	7
1850	94	...	6
1851	76	...	6
1852	93	...	10
1853	106	...	9
1854	46	...	3
1855	24	...	0
1856	16	...	1
1857	39	...	6
1858	29	...	7
1859	18	...	4
1860	45	...	7
1861	49	..	9
	1819		116

A large proportion of the deaths from fever in the table were from German and other immigrants recently arrived in the colony, and therefore not fairly a portion of Tasmanian mortality. Emigrant and convict ships have often brought to the colony severe types of fever, but beyond those immediately in contact with the sick in the hospitals and prisons, the diseases have not spread epidemically. Our climate seems antagonistic to the spread of febrile disease, when the people enjoy ordinary domestic advantages. The severe outbreak of typhus fever that occurred in 1839-40 so well illustrates this, that I shall dilate upon it, having refreshed my memory of the facts by recently going through the hospital records of the period and seeking information from the gentleman who had the charge, as head of the imperial medical staff, but who has now retired from the exercise of his profession, and holds the office of Speaker of the House of Assembly. I was, at the time the outbreak occurred, residing forty miles away from Hobarton, and had not a case of fever to treat in a district of upwards of 1,000 population. Popular rumour associated this epidemic with the arrival of the French discovery ships, "L'Astrolabe" and "La Zélée," which had put into this port in a deplorable state of sickness, principally from dysentery. From the examination of the public records of the Registrar-General's office and the hospital, I have satisfied myself that this rumour was unfounded. In July 1839, the prison ship "Marquis of Hastings" arrived in Hobarton, with 240

male convicts. So little fever had existed up to that date in this district, that the public registry of deaths of free people only enumerated four, two of the number in the colonial hospital. In the month of August six cases of fever were treated in the hospital, three of which died. In the month of September twenty-seven cases were treated, and four died. The majority of these cases were young men, eighteen to thirty years of age, received from the penitentiary mostly, and all the early cases prisoners by the "Marquis of Hastings." After this, convicts from private service and by other ships began to come into hospital; and in probation stations near Hobarton the epidemic broke out, no doubt from the transfer of men there from the prisoners' barracks in Hobarton. In October, thirty-one cases were admitted into hospital—eight died. In November, thirty-nine cases were admitted—six died. In December, sixty-five were admitted—eleven died. Two of these were received from on board the prison ship "Layton," just arrived, and one died on the day of admission, and the other two days afterwards. Here then was a fresh dose of the febrile poison imported. In January, sixty-five were admitted—nineteen died. In February, seventy were admitted—seventeen died. One of these belonged to the French ship "La Zélée." In March, sixty-nine were admitted—four died. In April, seventeen were admitted—one died. In May, six were admitted—no deaths. But in this month, a large house near the hospital was hired as a temporary hospital, and the records show one hundred and twenty-five admissions, and only one death. At the penitentiary, also, a hospital was established, and one hundred and thirty-three are returned without a death; but it is noted that several were received from the temporary hospital at Temple House, so that they were probably convalescents transferred to make room for fresh cases there. In June, thirteen were admitted into hospital—no deaths; at Temple House, one hundred and fifteen admissions—three deaths; at the penitentiary, one hundred and twenty-eight admissions—one death. In July, five were admitted into the penitentiary—no deaths; neither deaths in nor admissions into the hospital or Temple House. During this formidable outbreak, many cases were treated at convict road stations within a dozen miles of Hobarton. At two of these stations both the medical officers died, and the successor of one narrowly escaped. In the colonial hospital, one of the medical officers narrowly escaped with his life, and one of his pupils, twenty-one years of age, paid the penalty of his life for his

devotion to the sick, in the month of March. The apothecary of the establishment died in December, and some of the attendants (convicts) during other months. The "principal medical officer" attaches great weight to the fact, that the prisoners' allowance of animal food had just previously to this formidable epidemic amongst them been very considerably reduced. Over-crowding was always practised in the prison stations; the men being lodged in small bunks, one tier above another, with sleeping space of about 108 cubic feet. The same monstrous custom long prevailed, even with mothers and children, in convict nurseries, and invalid and lunatic stations. Now, to show how well our pure climate shielded the free classes in the city from the invasion of this epidemic, I am able to state that from August, 1839, to July, 1840, only twenty-one deaths from fever are recorded in the public registry, and of these fifteen died in the hospital, including those I have alluded to—medical officer, student, apothecary, etc. The total of fever cases for the twelve months, July, 1839, to July, 1840, I have given as 914 (probably some enumerated twice over, as I have before surmised) with seventy-eight deaths. In the eighteen years, 1844 to 1861 inclusive, the returns for all the convict stations and hospitals, and public hospitals in Tasmania give 1819 cases of fever treated, with 116 deaths. The rate being about 6¼ per cent. of cases treated, or one death in 15·68. Many of the cases, however, would be of the most ephemeral character, and scarcely entitled to be nosologically denominated fever.

In September 1840, just after this dire invasion of fever had alarmed the authorities, the first Quarantine Act became law, by which it was provided that—"It shall be lawful for the Lieutenant-Governor and Council, upon any unforeseen emergency, or in any particular case or cases with respect to any vessel arriving within this island, and having any infectious or contagious disease on board, or arriving under any other alarming or suspicious circumstances as to infection or contagion, to make such orders and give such directions in order to cut off all communication between any persons infected with any such disease, and the rest of her Majesty's subjects as shall appear to the said Lieutenant-Governor and the said Council to be necessary and expedient for that purpose, and to appoint certain places within the harbours of the Derwent or Tamar for the performance of the quarantine under this Act, when under the above recited circumstances, it shall be deemed expedient to

subject vessels to quarantine." This Act was amended, as I have before alluded to, in the following year, and makes no provision for landing the sick, or even any attendance upon the sufferers on board the vessels subjected to quarantine in the open channel, off Hobarton, etc., when no medical practitioner is on board. The inefficiency of the Act was thoroughly shown in 1857, when on the 31st October the emigrant ship "Persian" arrived in this port, with from four to five hundred human beings on board, having lost thirteen or more from the 9th August to this date. No journal was kept by the doctor, and I know, from the evidence subsequently elicited, that all the deaths were not registered in the registry of this colony. Many of these deaths were from typhus fever, which was then prevailing on board. She was anchored in the stream, off Hobarton, about a mile distant, and there remained four days and nights in quarantine, wanting, but not supplied with, additional medical aid. Three deaths occurred while she was at anchor, and were never registered anywhere. She was then towed by a steamer to Norfolk Bay, about thirty miles off, to the abandoned Invalid Station at Impression Bay, which had numerous buildings well adapted for a lazaret. The passengers were here landed, and properly cared for in every respect. A medical gentleman on the convict medical staff was engaged by the Colonial Government to attend upon the sick, with clerical and other assistance, and with ample supplies of all necessaries and comforts. Nine more deaths, however, subsequently took place during the two months of the emigrants detention there, and one afterwards in a country township, when the passengers were disseminated in the colony. This young woman acknowledged that she was ailing when she left the quarantine station, but concealed the fact. She did not infect any person about her in the healthy district where she died. It is somewhat remarkable that at this time deaths from "fever," under suspicious circumstances, were unusually numerous at the convict station, twelve miles away from the quarantine station, but with which nominally no intercourse was permitted. In one of the nine city deaths, indirect communication with this station could be traced. The ship was said to be well cleaned and fumigated during the fourteen days she was detained at the quarantine station, and was then certified to be fit to come into harbour to discharge cargo. She was placed alongside the wharf. One of the crew had been left behind at the quarantine station ill with

the fever. Eight of the sailors were in a few days removed to hospital ill with fever, but none died. One of the hospital attendants took it and died; and the steward of the hospital died also, the cause of death being registered "delirium tremens;" but in my opinion he died from this febrile poison. Two other inmates of the hospital were attacked, but the rest of the patients were removed to another establishment, and no more cases supervened. Parliament was sitting at the time, and the conduct of the Executive was warmly canvassed and formally censured for its tardiness and mismanagement. It was said in defence that, in the absence of the Governor in the interior, the ministers were afraid to act. This affair cost the colony a very large sum, and I believe the shipowners escaped the expense they ought to have borne. The captain and surgeon, however, got no payment from the colony, which they would have been entitled to under circumstances not entailing blame upon them. Good resulted from the stir that was made, and "Impression Bay Station" has been kept in readiness ever since for any similar emergency. From rumours I have lately heard, however, I fear that the instructive lesson taught by the different steps taken in 1839-40 and 1849-50 is beginning to be forgotten, and that we may be surprised again, without having a fitting place of reception for the prompt landing and treatment of fever-stricken passengers. I heartily indorse the resolutions of the Quarantine Committee of the National Social Science Association, and consider the detention on board plague-ships of the sick as a violation of all sanitary teachings, and murderous in its effects. I am convinced that the speedy landing and careful and generous treatment of sufferers in such circumstances will, in our salubrious climate, always be both the most humane, wisest, and safest course that can be adopted. In a few weeks after the "Persian", another emigrant ship, the "Trade Wind," arrived with typhus fever and whooping cough on board. She was promptly sent to Impression Bay Quaratine Station, and there detained thirty days. Her passengers were landed and efficiently treated, and the result was most satisfactory. Since that time no ship has been subjected to quarantine. A few weeks ago a vessel bound to Queensland with emigrants touched at this island for supplies. She anchored about eleven miles from Hobarton, within the range of the pilot's operations. She had lost nearly sixty passengers by typhus, and scarlet fever, and whooping cough. Her captain and other officials came up to the city for several days, and non-communication of per-

sons from Hobarton was not enforced. The medical officer on board being confined to his cabin by sickness, I was engaged to visit the passengers on behalf of the ship. There was a large amount of suffering from debility and inadequate medical and dietetic supplies, but no actual case of typhus at that time. I cannot understand how the port authorities allowed this ship to remain as she did; it appears to me not to be in accordance with the "Rules and Regulations of the Port of Hobarton." Great secresy was maintained as to the mortality that had occurred, and I failed to get a sight of the medical journal. When this vessel reached Brisbane, her destination, she was subjected to a long quarantine. A "health officer" for this port is appointed by the Colonial Government, and receives £100 per annum for the duty required. No returns of any kind seem to be required from him, at least none such are ever laid before Parliament, or published. It is much to be regretted that the queries of the Quarantine Committee, forwarded by the Secretary of State, did not elicit any response from the Tasmanian authorities. I have done my best to remedy the neglect.

Erysipelas. The deaths recorded in the returns under this head require no observation.

Metria. Though only four deaths are registered in the five years tabled, this disease had, in earlier years, at times given much alarm. The Convict Lying-in Establishment suffered severely from it in 1851-2, and many of its inmates were sent to country stations. I received some of them at the one under my charge, and very narrowly escaped the visitation of this fatal disease. An insufficient dietary, local mismanagement, and the bad site of the establishment in Hobarton, in my mind, most satisfactorily accounted for the origin and spread of the disease. As in the old countries, a case occurring in one medical man's practice is sure to be followed by many others. I noted not long since, in my monthly Health Report, two deaths from erysipelas, followed by one from metria, all attended by the same practitioner. The first case of erysipelas arose in a locality of the worst hygienic character, and the locality of the two succeeding deaths was only a shade or two better.

Pyæmia requires no remarks.

Carbuncle, or *Furuncle*, has never yet existed epidemically in Tasmania. As we import a large quantity of cattle from the Australian colonies for the consumption of Hobarton, I shall not forget the hints the Registrar-General of Scotland

has thrown out with regard to the prevalence of diseases of this nature, since pleuro-pneumonia has existed in Great Britain.

Influenza. Both epidemic influenza and ordinary catarrh are of frequent occurrence in Tasmania. They are often confounded together in the registry. In 1838 this country suffered in the months of October, November, and December severely, from what was commonly called influenza, but which was in fact catarrh of a sthenic character, frequently merging into acute bronchitis and pneumonia, and requiring depletory treatment. At that time the temperature was very variable; but strong, cold, dry winds from the southerly quarters generally prevailed. In November, 1847, a sthenic catarrh from like causes was general throughout the island. In 1851-2 influenza was epidemic throughout this and the other Australian colonies, and animals suffered considerably, particularly dogs, which died in great numbers. The asthenic character was extreme, and all depletory treatment was inadmissible. In 1860 epidemic influenza was universal in all the Australian colonies, and from thence, nearly a month later, reached Tasmania in July. In many families not a member escaped, and the deaths were numerous; for though only forty-one appear in the returns from "influenza" directly, many more cases were fatal by terminating in pneumonia, etc. In fact, in the month of July, when the disease was at its acme, the total deaths of the month were more than double the average of the previous five years, and nearly three times as many as in July, 1859. Young people suffered comparatively little, but it proved terribly severe and destructive to those far advanced in age. Its type was extremely asthenic. Atmospheric pressure was more continuously high than was ever before noted for many months. Calms were unusually prevalent. Rain-fall was small. Ozone was somewhat below the usual rate. The weather, indeed, corresponded very much with that stated to have marked the outbreak of cholera in London in 1832-49-54, with the exception that ozone was not absent in Tasmania, as it was in London. Animals were not attacked to the same extent as in '51-2. I contributed a detailed history of this epidemic to the *Australian Medical Journal;* it is published in the October number of 1860. The disease was over in August; but in September catarrh of a sthenic character, merging frequently into acute pneumonia, and requiring the lancet, occurred, and was confounded with the previous epidemic. In this month the weather was very

different from its previous state; but its mortality was the highest recorded for any of the five previous Septembers.

Dysentery, Diarrhœa, Cholera. Fluxes, as these bowel affections in the aggregate were anciently called, prevail more or less every year during the hot months of December, January, February, and March, but more especially amongst young children, as the ages at death show. While in England the deaths are most numerous in winter, the reverse is the case in Tasmania, and principally in children, from this group of diseases. The hotter, drier, and more variable in temperature the season is, the more prevalent and fatal do these diseases prove—1858 offers a good illustration of this fact. It drew from me an article on the subject, published in the July number of that year, in the *Australian Medical Journal.* The quarter's deaths for all Tasmania were 33 per cent. more than in the corresponding quarter of 1857, and nearly the same proportion for Hobarton, *i.e.*, 1858, 211 deaths; 1857, 169. This slightly more favourable contrast in Hobarton, strange as it may appear on behalf of the densest and usually most unhealthy district of the island, is in my opinion readily explained. In dry summers the rivers generally become a series of stagnant ponds only, and the water consequently less pure. Hobarton having its main supply from perennial springs on Mount Wellington, at a high elevation, the inhabitants generally have at all times excellent water. The influence of stagnant water in augmenting, and often no doubt originating, these diseases and their mortality, was painfully forced on my attention in the summers of 1840 and 1845, when bowel affections were more than usually prevalent and fatal. On both occasions I was stationed in country districts, though widely apart, where the water supply was reduced to stagnant ponds from the dryness of the season. In the first year scarcely any of the one thousand inhabitants of the district, all under my medical care, escaped diarrhœa and dysentery, and but few children under one year old but perished. In the few exceptional cases, the water drank was from wells or springs. The year 1845 was similarly characterised, though my sphere of practice then was in a part of the island more than fifty miles north of the former as the crow flies, and on the other side of the island water-shed. The probation gangs suffered severely where their water-supply was from the source alluded to; but the soldiers, and another party of prisoners, who obtained their water from a well, were but little affected. Even in the usually most healthy rural environs of Hobart

city, where the people do not enjoy the same advantage of pure water as the citizens do, the former suffer more at these visitations than the latter. In January, 1858, the mean temperature exceeded the fourteen years standard by + 5·16 degrees; the mean daily range was 24 degrees; the extremes being 36 and 16. In February the mean temperature was + 4 degrees higher than that of the previous fourteen years. The mean daily range was 22·32 degrees; the maximum being 36 and the minimum only 7. A drought of seventy-three days ended in this month, during which only ·83 of an inch of rain had fallen. The March weather was not quite so unfavourable, and the number of deaths diminished; the greater number in fact being the termination of attacks originating in the previous two months. Asiatic cholera has not yet visited Tasmania, or any of the Australian colonies. I was somewhat apprehensive during the late epidemic in the Mauritius, that the sugar-ships might be the means of conveying it to these colonies. When I state that one of our regular traders at this time landed a sailor, who died in hospital here from scurvy, it is evident the hygienic management of the vessel would offer no bar to its transmission. Sanitary improvement in the mercantile marine is much required. Scurvy from the shipping is much too frequent, though less than it used to be. Yesterday the "Statistical Return of the Health of the Royal Navy for 1858" came into my hands, and there I observe that only one death from disease (pneumonia) occurred in the three ships-of-war on the Australian station in that year, with a mean force corrected for time of 380 men.

Rheumatism. Six deaths in five years from rheumatic fever shew that this disease is trifling in this climate.

Native Pock. This nosological term is peculiar to these colonies. The disease is a spurious kind of chicken pox. Before a return of the "cause of death" was given by medical practitioners, it was rather a frequent entry in the records by undertakers and non-medical reporters. It prevailed extensively in one of the convict nurseries when under my charge, and though no fatal cases occurred, the accompanying fever was often severe. It is quite as contagious as the other exanthemata. I have seen it break out at the same time that the child was under vaccine influence.

Syphilis. It will be patent from the ages in the table that eight of the ten deaths were congenital; the other two adults, moreover, were cases of secondary disease. Before this ceased to be a convict colony, congenital syphilis in children was a frequent disease, and almost without excep-

tion the sufferers perished under twelve months of age. Nevertheless, it was surprising what large healthy offspring most of the women, who had been prostitutes before their transportation, produced in this island. Venereal disease is a very mild and comparatively infrequent disease, in any of its primitive forms, in Tasmania. The "social evil" is very rife notwithstanding in this seaport.

Purpura and Scurvy. But two deaths are recorded under this head—a child who had been insufficiently nourished, and a sailor, from a ship in harbour, who died in the public hospital.

Cancrum Oris. Formerly this horrible disease was very common in the convict institutions, where under-feeding both of mothers and children, over-crowding, and other hygienic mismanagements were rife.

I have now commented on those diseases in the zymotic class which are of primary interest to the Epidemiological Society. I would append some observations on tubercular disorders and diseases of the respiratory and nervous system, and the organs of circulation, in order more fully to show the health-condition of the population, and the influence of the climate.

Scrofula is a rare disease in Tasmania, except from such causes as I have before alluded to in our charitable institutions. Our pure dry air, bright sunshine, abundance of animal food, save us from this sore affliction of the mother country.

Tabes Mesenterica may be parried by reference to the remarks on scrofula.

Phthisis. In the English mortuary tables this destructive disease holds the first place; in my table only the second; convulsions causing a larger share of the deaths. Forty-seven deaths per annum in a population of 25,000 people is very little more than half the London rate, by Dr. Guy's table; or 1880 per million, Hobarton, to 3230 per million, London. Of the 235 deaths, in the five years, only thirty-seven of the number were born in Tasmania. The hereditary tendency in many of these was great; both parents, natives of Great Britain, having died from consumption. Several of the thirty-seven were brothers and sisters. One family alone gave three of the number. At the census of 1857, 30,160 of the 81,492 total population were born in the colony, and the relative proportion of native Tasmanians now is still greater. I have studied this interesting phase of climatic influence on this disease for many years, with intense application, and I have obtained the history of almost every case in which death occurred, and kept accurate me-

morandums. With a climate subject to such frequent, sudden, and wide daily ranges of temperature, I did not expect, with my original English notions on the subject, to find so great an exemption from this sore affliction to families. A young married lady, whose case I am intimately acquainted with, left England in 1833 for this colony, her father and husband (both medical men) being fully impressed with the conviction that change of climate could alone save her from the consumptive tendency she evinced. She has never had a symptom of the disease since her arrival in Tasmania, and has a large family born in the colony, not one of whom has shown a consumptive tendency. Both of her two only sisters, younger than herself, have died in England from phthisis, since her expatriation. In the last number of the *Lancet* received in this colony (August 16th) I see that, at the Brussels Congress of the International Association for the Promotion of Social Science, a question for discussion is propounded—"Does not the improper and insufficient diet of the working classes contribute to the increase of pulmonary consumption?" I do not doubt that the abundant supply of wholesome food, a good share of which is animal flesh, enjoyed by everybody in Tasmania, concurs with the salubrious climate in saving the native born from the tubercular diathesis.

Hydrocephalus. Less than half the London rate of mortality from this disease is shown by the returns The annual average of deaths during the period under consideration was eight. At the same time I am convinced that several of these ought to have been registered "cephalitis," and arose from careless exposure of the head in this sunny and variable atmosphere.

The "Diseases of the Nervous System" form a very large proportion of the total deaths from all causes. It is remarkable that this order bears a greater preponderance to the others than even in the hotter climates on the Australian continent. By all accounts, spirit drinking is no less prevalent there than in this island. But though the climate is hotter, neither atmospheric pressure nor temperature is liable to such sudden and frequent daily changes. Moreover, the colonists there adapt their attire more judiciously to the climate than is done in Tasmania. Here in sweltering hot winds you will see many persons clothed in black cloth garments, with black hats, as in winter. Children too are very recklessly exposed, without covering on the heads, be the weather what it may. With strange perversity, the period when the natural covering is the scantiest, the artificial pro-

tection is the least cared for. Hence convulsions carry off a very undue proportion of them. It was long ago remarked by Count Strezlecki that, owing to the diaphaneity of the Tasmanian atmosphere, polar-intensity was greater than on the Australian continent, even as far north as Moreton Bay. The haze that habitually intercepts and mitigates the solar rays in the other colonies is seldom present in Tasmania, though the general temperature in the former is so much greater. I have seen days here when sea breezes have been blowing with a clear blue cloudless sky and hot sun, when the difference of temperature between the sunny and shady side of the street has been fifty to eighty degrees, and yet thoughtless people expose the bare head under such circumstances. I have a great opinion of the hygienic value of our clear solar rays, but common sense would dictate that the head ought to be protected. Even the rude aborigines of Tasmania, who were regardless enough of covering elsewhere, plastered the head with a thick covering of clay and grease. Though only one death from sun-stroke is tabled, I believe that many of those returned apoplexy and paralysis originated in this way. Sudden deaths from this group of diseases are commonly attendant upon great variations of atmospheric pressure and temperature. There were four deaths from *tetanus*. One was from the idiopathic form of the disease; the others from the traumatic, and I was satisfied that the latter were much influenced by the weather prevailing at the time—hot, hazy, moist, calm, and little ozone. The two deaths from insanity give no index to the prevalence of the disease in Tasmania, as the cases are removed to two establishments in other districts for treatment. There is about one lunatic to every 300 of the population.

Diseases of the Circulating System are equally under the influence of aerial vicissitudes with those of the nervous system. The average of thirty deaths per annum on this population is about 28 per cent. above the London rate. The sufferers, however, are mostly Europeans, who have led irregular and excited lives.

Diseases of the Respiratory System. Notwithstanding the variations and the wide daily ranges of temperature, this group of diseases is much less fatal than in London. The annual average of seventy deaths is at the rate of about 2800 per million, whereas the London proportion is 3716. It is evident, therefore, that the pure, dry air greatly modifies the effect of changes of temperature. No doubt, the masses here too enjoy better clothing, food, and habitations than in England.

OBSERVATIONS ON THE INFLUENCE OF PANDEMIC CAUSES IN THE PRODUCTION OF FEVER.*

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(*Read May 4th*, 1863.)

The expressions epidemic, epidemic cause, epidemic influence, epidemic constitution, pandemic cause, or pandemic influence, occur so frequently in medical writings and discussion as to show the general belief in the profession that the ordinary climatorial, endemic, and personal causes are insufficient to account for the variations in the prevalence and fatality of disease, yet wonderfully little is known as to the nature of the cause in question, its mode of operation, the diseases it induces, or the extent to which its influence is experienced; all points on which more extended information is required before the present knowledge of ordinary causes can be rendered more precise.

The advance of information on this subject has been much impeded by the disposition, so strong among medical writers and observers, to regard disease as they individually see it, and to refer its prevalence and character to circumstances obviously affecting the population within their immediate observation; while, had their investigation been extended to other countries, a similar prevalence of disease might have been found under local circumstances very different from those thought so essential to its occurrence among themselves, thereby indicating the influence of a cause operating more extensively than they had reckoned on.

It is proposed to elucidate this important subject in connection with the prevalence of fever, mainly with the assistance of the statistical returns of the sickness and mortality in the army from 1817 to 1836. These afford a continuous record of the progress of disease in bodies of men, small it is true, but pretty constant in numbers, and under nearly similar circumstances at each place, for many successive

* This paper contains the results of an investigation which has been submitted in detail to the Director-General of the Army Medical Department, for publication in the forthcoming volume of the Army Statistical, Sanitary, and Medical Reports.

years. The stations extend from Ceylon to Jamaica in longitude, and from Great Britain to the Cape of Good Hope in latitude; they present a great variety of climate, and the greatest difference as to the ordinary endemic sources of disease, yet febrile affections prevail among them, presenting periods of increase and decline with much regularity, and which can often be traced through them all.

Disease being merely the reaction of the system under the influence of causes subversive of its normal and healthy functions, it is clear that whenever it arises such antecedents must have been in operation; and the previous action of the antecedent may be concluded from the results, with as much certainty as in ordinary physical investigations. In etiology, it is true, the supposed causes are often numerous and complicated, and it may not be easy to say whichever, or what combination of them, is efficient in bringing about the result; but the only method of attaining this end is that pursued in physics, viz., eliminating one or more that are essential to a particular conclusion, and observing whether the result continues unchanged, or how far it becomes modified under the attending circumstances. In practice it is seldom allowable or possible to carry out this, as if it were merely an experiment in physics or chemistry; nevertheless, a careful observer will generally discover in the position of those around him such a variety of circumstances as will enable him to make a sound induction. Often, however, after the closest examination, the evidence remains defective in some particular necessary to a satisfactory conclusion, in which case observers cannot be too careful to avoid substituting mere opinion, a practice which has existed, and still exists, far too generally among medical men, and which has checked the progress of medical science enormously.

In estimating the prevalence and intensity of the causes of disease at different places, either the number of attacks or of deaths may be made use of, or these may be combined; each plan has its advantages, but neither is unexceptionable. 20 per cent. of the strength admitted with fever, for example, in England or Canada, indicates a very different amount and intensity of cause from the same number admitted in the West Indies; and even in the latter the same percentage of admissions in different islands may indicate very different activity of the cause of disease, and still more in different years. The deaths present a better and more easily comparable series of facts than the admissions. When a great disposition to slight disease has existed, not leading

to marked increase in mortality, they will fail to show it; but when disease has been both more frequent and more severe, or of a more aggravated type, without increased frequency, they will give the best indication of the force of the causes which have been in action. In what follows, therefore, the deaths will be employed for the purpose in view (unless where otherwise specified), and, to facilitate comparison, will be given in the form of the ratio per 1000 of mean strength for each year at the respective stations.

Individuals or bodies of men differ greatly in sensitiveness to the causes of disease, according as they are acclimated or not. Change of station, and, much more, change of climate, subjects them to a modification of the external influences acting on the system, and some time elapses before the resulting modification of its actions is fairly established. While this transition is in progress, should the individuals be subjected to other causes of disease, such as malaria, exposure, fatigue, indifferent food, etc., especially if during an epidemic period, it is found they are affected in higher proportion, and the mortality among them is much greater than among others who have become acclimated by a longer residence. Our military annals present many illustrations of the danger of sending troops abroad, especially to the tropics during epidemic seasons; the history of the West Indies teems with them; and even in temperate climates, military expeditions during such seasons have always been disastrous, such as that to Walcheren in 1809, or that to the East in 1854-55, while others which have fallen on happier times have been much less fatal.

It is frequently stated by those who hesitate to admit the operation of an epidemic or pandemic cause, that were it existing, every locality within its influence should manifest the disease or diseases it is supposed to induce to nearly an equal extent; this, however, is not found to be so; on the contrary, in a group of stations under the same general influence, disease may prevail to a very different extent in each, and attain its maximum one year at one, and in another at the next station to it, its intensity varying from time to time, owing to peculiarities in the meteorological, local, or other circumstances. As it is important to place this point in the clearest light, the mortality from fevers, mostly remittent or yellow, is given below for three groups of stations from 1826 to 1831 inclusive, during which there was a great prevalence of fever both in the Mediterranean and West Indies.

TABLE I.—*Annual Mortality per* 1000 *Mean Strength, from Fever, at undermentioned Stations.*

Stations.	1826.	1827.	1828.	1829.	1830.	1831.
Ionian Islands.						
Corfu	9·1	14·0	10·6	11·4	6·3	4·8
Santa Maura ...	19·8	21·4	149·7	76·9	62·2	32·6
Cephalonia.....	9·5	20·6	26·7	14·2	21·2	13·0
Zante	12·4	23·1	8·9	...	30·8	3·4
West Indies.						
Demerara	64·5	121·6	114·0	38·9	65·2	79·5
Trinidad	55·4	54·4	133·1	13·2	21·6	31·0
Tobago	51·3	15·5	62·9	80·9	125·0	82·4
Grenada	4·0	11·2	93·0	50·2	6·0	3·6
St. Vincent.....	10·0	6·5	9·4	14·3	10·8	10·3
Barbadoes	5·7	8·7	5·0	0·8	2·2	2·7
St. Lucia.....	39·2	210·7	24·7	35·0	33·3	35·2
Dominica	85·7	20·9	...	26·4	22·6	12·8
Antigua	...	25·4	22·5	3·8	13·4	9·1
Jamaica.						
Port Royal.....	81·2	151·9	10·7	74·6	144·9	...
Fort Augusta...	48·6	277·6	77·4	56·8	29·6	64·5
Up Park Camp	60·7	216·8	108·3	21·4	78 8	69·5
Stoney Hill.....	4·6	276·7	28·3	7·9	5·8	147·8
Spanish Town...	171·0	140·2	71·4	43·7	112·9	198·7

The places in the first group in the above table lie on the Western Coast of Albania and the Morea. Corfu is about sixty miles north from Santa Maura; Cephalonia and Zante lie to the south of the latter, in the order named; and the three, from north to south, do not cover more than seventy miles.

The West India group extends from lat. 7° N. to 17° N., and from long. 57° to 62° W., in the order named. The stations in Jamaica are all on the south of the island, and from Fort Augusta, the most central, Port Royal is distant two miles to the southward; Up Park Camp, five miles and a half to the eastward; Stoney Hill, eight miles northward; and Spanish Town eight miles to the westward.

On examining the table, the mortality from fever is found to have attained its maximum at Santa Maura in 1828, and to have remained high for the next two years. Corfu attained its maximum in 1827, and subsequently declined. Cephalonia reached its maximum in 1828, with an abatement in 1829, and a second maximum in 1830; while Zante had maxima in 1827 and 1830, with very little mortality between.

The West Indian group shows a high rate of mortality from fever from 1827 to 1830, but differing in each year;

and the maxima occur in different years in contiguous islands, and without regularity as to geographical position. Thus, at Demerara the mortality was highest in 1827, with but little abatement in 1828; the maximum in Trinidad was in the latter year; in Tobago it went on increasing until 1830; in Grenada the maximum was in 1828; in St. Vincent in 1829; and in Barbadoes and St. Lucia in 1827. In Dominica the mortality was highest in 1826; while at Antigua the maximum was in 1827, and in 1828 the mortality was about as large.

In Jamaica all the stations attained their maximum in 1827, save Spanish Town, in which the mortality in 1826 exceeded that of 1827. The subsequent course, however, was very different; Port Royal had a very low ratio in 1828, from which it increased to a high proportion in 1830, and in 1831 had not a death from fever; Fort Augusta, within two miles of it, retained a high mortality in 1828, had its minimum in 1830, and more than doubled again in 1831; Up Park Camp had its minimum in 1829, had a second maximum in 1830, and declined somewhat in 1831; Stoney Hill was low in 1829 and 1830, but the mortality increased very greatly there in 1831. Spanish Town had its minimum in 1829 also, there was a great increase in 1830, and in 1831 the deaths were more numerous than in any year in the table.

Though these facts be conclusive as to all places within the operation of an epidemic cause not being similarly affected as to time and degree, more striking illustrations still can sometimes be obtained from the course of disease at a single station. Thus, at Newcastle in Jamaica, where the cantonment consists of a series of wooden houses, accommodating about thirty-four men each, and which are erected on the crest of a narrow mountain ridge, from 3500 to 4000 feet above the sea, in 1856 fever prevailed from September to December, causing considerable mortality. The cantonment is only about 800 yards in length, and within this space there were four zones, embracing all the huts or tents right across the ridge in which fever scarcely shewed itself, while there were three intermediate zones, in which it was both frequent and fatal.* All were exposed to the same epidemic influence, but within half a mile there were no less than four positions of immunity from disease, alternating

* Observations on Yellow Fever among the Troops at Newcastle in Jamaica. *British and Foreign Med.-Chir. Review*, Oct. 1859, p. 445, et seq.

with three others, in which it continued to show itself for months. Marked limitation of the disease to certain buildings, while those in the vicinity continue exempt, is not uncommon in the history of yellow fever.

Facts of the description just mentioned show that the evidence in favour of contagion, sometimes drawn from epidemic disease not having invaded localities under quarantine, must be received with the greatest caution. There was no attempt to limit the communication at Newcastle in 1856, yet the prevailing fever confined itself within certain limits; had the healthy spots alternating with these been placed in rigid quarantine from the commencement, most people would have concluded that that had preserved them from attack; whereas the result showed that, with the freest personal communication, fever did not develope itself in them.

Though in a group of stations a high mortality may occur at some in one year, and at others in another, yet for the most part the outbreak of sickness is pretty well defined as to season at each; but there is often a striking difference in this respect between stations in the immediate vicinity, and these may retain their individual peculiarities for a long period of years. The following table, which gives the deaths for each month for the stations in Jamaica, already mentioned (except Fort Augusta, for which the requisite details were not available), will show that the general curve of mortality, and the periods of minimum and maximum, are sensibly different from each. The deaths for all diseases are given, it being impossible to separate those for each, but as five-sixths of these were from fever, they will afford a good indication of the activity of the causes of these. To facilitate comparison, the numbers for each month have been calculated on the supposition that 1000 deaths took place at the station. The table has not been brought down beyond 1820, as subsequent to that year the troops were often removed where disease manifested itself severely at a particular point, and the results would be less trustworthy; but, to the present day, the respective stations display much the same character.

Thus, while Port Royal has an irregular curve, with a low minimum in February and a higher in July, and maxima in April, September, and November, the other stations have each a single curve; Spanish Town, with its minimum in May and a disposition to another in September, and its maximum in December; Up Park Camp, with its minimum in April, and maximum in November; and Stoney Hill,

with the minimum in May, and maximum in October. In consequence of the severe epidemic of 1819, most of the troops were removed from Up Park Camp in August and September, and did not return until December, which gives a considerably different result if 1819 be included.

TABLE II.—*Mortality in each Month in* 1000 *Deaths from Disease, among the White Troops, at the undermentioned Stations in Jamaica, between* 1804 *and* 1820.

Month ending	Port Royal, 1807 to 1820 (14 years).	Spanish Town, 1804 to 1820 (17 years).	U. P. Camp, 1804 to 1820, excluding 1819 (16 years).	U. P. Camp, 1804 to 1820, including 1819 (17 years).	Stoney Hill, 1804 to 1820 (17 years).
January 20th	65	94	75	64	110
February „	37	45	37	30	79
March „	75	43	28	22	42
April „	101	45	26	21	21
May „	91	33	32	28	17
June „	90	40	34	30	25
July „	50	71	40	52	32
August „	65	83	80	12	66
September „	120	66	95	127	91
October „	89	106	156	145	231
November „	112	152	260	227	183
December „	105	222	131	129	103
Year	1000	1000	1000	1000	1000
Total deaths recorded in period	536	995	1929	2398	967

In extended commands, such as the West Indies, Canada, Ionian Islands, and Ceylon, which embrace several subordinate stations, at all of which the maximum or minimum of mortality may not occur in the same year, the aggregate, as given for single years, may neither present the sudden increase nor decrease seen at others where the troops were closer together, as at Malta, Gibraltar, or Bermuda. At the latter too, excessive, or very low, rates of mortality are more confined to single years, while in the former these are usually more diffused. A large mass of civil population resembles the more extensive military commands in these respects.

The statistical reports on the health of the army embrace the home stations; Gibraltar, Malta, and the Ionian Islands, in the Mediterranean; Nova Scotia, Canada, Bermuda, Jamaica, and the West India command, in the basin of the Atlantic, to the north of the Equator; and the Cape of Good

Hope to the south of it; in the Indian Ocean, Ceylon, to the north of the line, and Mauritius to the south of it. The returns for all these are available from 1817 or 1818 to 1836, except for the home station, for which they are published from 1830 only. Besides the above, there are incomplete returns for the troops on the West Coast of Africa, and the military officers employed there; and of the troops and civil population in St. Helena, and those of the squadron on the West Coast of Africa, available for the purposes of this investigation. The deaths from fevers of every description each year for these stations have been taken out, reduced to the ratios per 1000 of mean strength, and tabulated for comparison.

The kinds of fever, of course, differ very much in stations so far separated, and in such varied climates. In Canada, Nova Scotia, Bermuda, Gibraltar, Malta, Cape Town, Mauritius, and the home stations, the forms of the disease were almost exclusively continued, with yellow fever at Bermuda in 1819, and at Gibraltar in 1828. In the Ionian Islands the remittent was by far the most fatal form. In Ceylon the mortality arose from the remittent fever; and in the West Indies and Jamaica, either from the periodic forms or from yellow fever.

In my original paper*, the tabulated ratios of mortality were examined in detail for each year at all these stations, and the investigation resulted in the detection of the law, that a series of morbific causes originate, or at all events become apparent, in the southern hemisphere, and are propagated from that to the northern with great regularity. These waves occupy about two years in passing over a given station; the mortality from fever, of whatever description that may be, increasing during their passage, and subsiding again as they move onwards. They follow each other at intervals of a few years, and may be traced from the Cape of Good Hope, where they first become sensible, to Iceland; and some embrace Ceylon in 80° E. longitude, and New Orleans in 90° W. longitude, or nearly half the circumference of the earth; and, were information for other places available, no doubt their passage might be demonstrated still more extensively. An influence of this description is more correctly designated "pandemic" than "epidemic;" and accordingly I propose designating the successive impulses as "pandemic waves."

* [See the Army Statistical, Sanitary, and Medical Reports for 1861, p. 403.—J. N. R.]

It would occupy too much time to go into a full demonstration of this law at present; and besides, in the first instance, the subject is better suited for a close examination in the study than for a meeting of the Epidemiological Society; I must, therefore, refer to the original paper for the necessary details. I may, however, give here the course of a few waves, and show the connection with the outbreaks of febrile disease among the various civil populations, of which I have information.

Thus, a pandemic wave became apparent at the Cape in 1822. In 1823 this reached the coast of Africa and Mauritius. In 1824 its influence was experienced in Ceylon, Malta, Gibraltar, and the West Indies; in the Ionian Islands and Bermuda, the high mortality resulting from a previous wave was continued this year. In 1825 Jamaica, which had shown a slight advance in the death-rate the previous year, had a terrible epidemic; and Nova Scotia and Canada were this year likewise overspread by the wave. From the table given by Dr. Murchison in page 37 of his work on fever, it appears that the admissions at the fever hospitals in London and Dublin showed an increase in 1824; and in 1825 this took place at those in Cork, Glasgow, and Edinburgh also; the greatest sickness seems to have been in 1826 and 1827 in England and Ireland, but in Scotland it was highest in 1828. In Iceland typhus, with some other forms of epidemic disease, was very prevalent in 1828-29.*

Those familiar with the history of yellow fever will recollect that it broke out at Ascension in 1823, after the arrival of the "Bann" with the disease on board; and they, who think the fever was communicated from the crew to the inhabitants, have always maintained that the want of proof of the existence of an epidemic cause at Ascension at the time was strong evidence in support of their views. The fact stated above that a pandemic wave was at the Cape in 1822, and had reached the Coast of Africa in 1823, and consequently embraced Ascension, will place the occurrence of the fever there in a different light. The outbreak of 1838 took place under similar circumstances; a pandemic wave, apparent at the Cape in 1835, was experienced at Sierra Leone in 1837-38; and early in the latter year unusual and excessive rain having fallen at Ascension, as it dried up, the fever broke out.

During the passage of the pandemic wave of 1822, the

* British and Foreign Med. Chir. Review, vol. v, p. 464.

first Burmese war commenced, and troops were sent to various points of that territory, who suffered much in 1824 and the following year from fever. Those at Rangoon were affected early in 1824 with the dengue, or what in the West Indies has been called the dandy fever. This form of disease appeared at Calcutta at the same time, and the following year broke out at Berhampore and places in the vicinity. Plague broke out at Cairo in 1824, and carried off 30,000 persons; the following year it prevailed in Lower Egypt, and was rife at Constantinople in 1826, and reached Odessa in 1827.

Another pandemic wave appeared at the Cape in 1824, and fever displayed much intensity there in 1825, when also it was experienced on the West Coast of Africa, and slightly at Mauritius. In 1826 it was much stronger at Mauritius, and was beginning to be felt in the West Indies. In 1827 it was in full operation in the West Indies, Jamaica, and Bermuda. There was an increase in the mortality from fever in the Ionian Islands in 1827, but Malta and Gibraltar did not present any; in 1828, however, there was an intense epidemic of yellow fever at Gibraltar, causing a loss of 121·1 per 1000 of strength, and Malta had a decided increase in its death rate; the mortality in the Ionian Islands increased also, and in one of them, Santa Maura, remittent fever proved fatal to 149·7 per 1000 of mean strength, or nearly a fourth more than at Gibraltar. This wave seems to have followed that which preceded it so closely, that among the civil population in Great Britain and Ireland it is difficult to separate the one from the other.

While such mortality was taking place under the operation of this wave from yellow fever at Gibraltar, and from ordinary remittent at Santa Maura, other febrile affections were rife in other parts of the Mediterranean; thus petechial fever prevailed at Naples in 1828, and plague was very common in Egypt, Syria, Albania, close to Santa Maura, and throughout Turkey in Europe in this and the following year.

In like manner it can be shown that a pandemic wave, which appeared at the Cape in 1827, was in operation in Great Britain in 1831-32; and another, which was experienced at the former in 1831, was in operation in the latter in 1835-36-37, and this course seems to have been pursued regularly as far as records extend.

The occurrences in the Mediterranean in 1828 are extremely interesting and important. There, under the same pandemic wave, while yellow fever was causing such mor-

tality at Gibraltar as to induce many to think it an imported disease, remittent fever, the undoubted product of the locality, was causing a much higher one at Santa Maura; and other forms of febrile disease, petechial typhus at Naples, and plague in Albania, were prevailing on either side of the latter. It must, therefore, be concluded that though the pandemic cause determines the occurrence of febrile disease in places over which it passes, the peculiar form, and even the frequency, of the disease is determined rather by the circumstances whether meteorological, malarial, hygienic, or social, to which each population is subjected. The same local circumstances may exist in other years, and, so far as can be estimated, to an equal extent; but fevers do not become rife; yet, no sooner is the pandemic cause added, than these seem to acquire a potency which is almost inexplicable.

Though, as a general rule, the peculiar form of fever developed is that usual to the locality, still there are exceptions, and of sufficient importance to require more particular notice. Thus, yellow fever is only an occasional visitant at Sierra Leone and on the Coast of Africa, Gibraltar, Bermuda, New Orleans, etc. Plague, though commonly confined to Egypt, Syria, and Turkey in Europe, has shown itself elsewhere, as at Malta in 1813, in the Ionian Islands in 1815-16, at Noja in Italy in 1817. And the dengue fever, which first attracted attention of late years at Rangoon and Calcutta in 1824, was seen in the West Indies in 1827-8. These casual irruptions of the new form of disease have always taken place during the passage of a pandemic wave; and other places, under the influence of the same wave, have manifested other forms of febrile affections. There are many instances of this. Thus, in addition to that of 1828 in the Mediterranean, already given, plague appeared in Corfu at the end of 1815, in a marshy district in which remittent fever had prevailed just before, and was thought to have been limited by quarantine, until it ceased in May, 1816. That year it broke out in the village of Comitato, in a mountainous situation in Cephalonia, in the beginning of June; no measures were taken to limit it before the end of the month; but, nevertheless, it did not attack any one out of this village, where it ultimately disappeared in the middle of July.* The garrison of the island in 1816, according to Hennen, consisted of 396 men, and the deaths

* Statistical Report on the Mediterranean, p. 39 *a*.

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from fever were seventy-eight,* or 197 per 1000 of strength; the inhabitants also suffered more from fever that year than usual. Such facts lead to the conclusion that the pandemic cause can determine to a certain extent the resulting form of fever, though local and temporary circumstances may often be more powerful in this respect, and may even determine a different form.

Yellow fever prevailed at Sierra Leone in 1823, 1829-30, 1837-38, and 1847, but not exclusively. In the first three periods yellow fever broke out after some showers had fallen, but before the periodical rains fairly commenced; and on their setting in heavily, the fever changed to remittent. In 1823 there was a break in the rains in the middle of July, when the yellow fever re-appeared, but on their recurrence remittents only showed themselves. In 1837 the yellow form of the disease appeared again after the rains ceased. In 1847 the disease was later in showing itself, the rains had commenced as usual; 12·44 inches fell between the 4th and 24th of June, and the first cases of fever were common remittents; from the 25th June to the 4th August, however, there were only 9·58 inches of rain (the following year in the corresponding period there were 31·33 inches), the first case of yellow fever occurred on the 29th June, in an unacclimated European, who arrived in the colony the previous February, and the disease continued among the colonists until the beginning of August. The wet season was rather irregular in 1847, and dropping cases occurred at intervals afterwards, but chiefly during the periods characterised by comparative absence of rain. The majority of attacks were then from remittent, however. On the cessation of the rainy season, some other cases of yellow fever presented themselves.† These alternations of remittent and yellow fever, as the rain was more copious or scanty, show a connection between the meteorological conditions and the form of the disease too obvious to be overlooked. In fact, at Sierra Leone, as elsewhere, yellow fever is a disease of fair weather; a certain amount of rain or moisture under the surface must have preceded its outbreak, but a large quantity of that invariably checks it until the return of more settled weather, and a stiller atmosphere. A striking instance of the influence

* Topography of the Mediterranean, pp. 298 and 302. At p. 283, the strength is stated in the text to have been "three hundred and seven", which would have made the mortality 254 per 1000.

† These facts are mostly from the official Reports of Barry, Scheltz, and Fergusson, to which I had access at Sierra Leone. The information for 1847 was the result of my own observation.

of heavy rain in suspending yellow fever was afforded at Newcastle in Jamaica, in 1856, when the disease nearly disappeared for three weeks in November, but commenced again as the weather became settled and fine. The effect of rain followed by a warm still state of the atmosphere in inducing fever is described in a very interesting and circumstantial manner, in Mr. Ralph's memoranda on the yellow fever in the 2nd Regiment at Barbadoes in 1816, and is well worthy of a perusal.*

It is an interesting subject of inquiry whether the pandemic wave acts on the system, rendering that more susceptible of the influence of the ordinary causes of disease, or on these themselves, giving origin to a more concentrated or a different kind of poison, which generates either a more virulent, or a new, form of disease; or whether it affect both, increasing the activity or altering the kind of the causes, and enhancing the liability of the body to be affected by them. The information on these points, however, is very limited and unsatisfactory. I have observed that, prior to and during an epidemic of yellow fever, the urine contained an unusual quantity of urochrome, giving a deep reddish brown colour when treated with nitric acid and set aside for some hours. Something similar has been observed with regard to cholera. These facts may tend to show that the body itself is affected by the pandemic cause, but the observations require to be repeated before much weight can be attached to them.

In the above remarks, the influence of the pandemic cause has been brought under consideration in so far only as concerns febrile diseases. It must not be concluded, however, that its operation is confined to them; cholera and affections of the bowels, scurvy, and even affections of the lungs, appearing to vary in prevalence and severity over large areas in a manner indicative of the operation of an intermitting cause of this description; but I have not yet been able to examine the subject in detail.

* Bancroft's Sequel to an Essay on Yellow Fever, p. 440.

ON AN OUTBREAK OF TYPHOID FEVER AT WING, BUCKS.

By EDWARD R. HARVEY, M.B, M.A.,*

LATE MEDICAL REGISTRAR, AND LECTURER ON PHYSIOLOGICAL CHEMISTRY, AT ST. GEORGE'S HOSPITAL.

[*Read June* 1, 1863.]

An application having been made at St. George's Hospital in the middle of February last, that a physician should visit the village of Wing for the purpose of investigating its sanitary condition, I undertook to go there, and devoted February 16th and the following day to the inquiry.

The parish of Wing consisted at the last census of 1502 inhabitants, of whom one-third is scattered through four hamlets and farm-houses, and the remaining 1000 live in 195 cottages, clustered on a hill or mound, from which the ground falls away on all sides, being encircled for two-thirds of its base by a wood. It would be difficult to find a village where drainage could be so easily and perfectly effected. That they had taken advantage of their position was the general impression of the inhabitants, who boasted, one and all, that they had capital drainage; and the appearance of the village is undoubtedly clean; yet it was among these 1000 people that fever has since October been alarmingly and fatally prevalent. At the time I was in the village in February last, it was calculated that 150 cases had occurred, of which eight had been fatal. Since then I have learnt by a letter from the esteemed vicar, that there have been fully fifty cases more; and ten more deaths have taken place, making in all as nearly as can be calculated 200 cases, or one-fifth of the population, with a mortality of 9 per cent.

To satisfy myself as to the nature of the disease which I had been requested to investigate, I visited twenty-six families who had suffered or were still suffering. In all cases the account was the same. The leading features of the complaint were pain in the belly, diarrhœa, and hæmorrhages. No eruption had been noticed, either by the medical man or the attendants: but this arose partly from the darkness of the rooms and partly from its not being carefully looked for, for

[* Dr. Harvey unhappily died at San Remo, North Italy, January 24, 1864. —J. N. R.]

in several cases I discovered well-marked rose-spots, disappearing on pressure. The patients were for the most part young, another evidence that the fever was typhoid or pythogenic. I neither saw typhus, nor had the medical men seen a single case of mulberry eruption throughout. The most interesting part of the inquiry was as to the cause of this violent outbreak. Several facts were immediately elicited. In the first place, "fever" was not new to Wing. On referring to the Register of Deaths, I found that Wing belonged to a sub-district of Leighton Buzzard Union containing 2448 persons, and in this sub-district the following deaths from fever and diarrhœa have occurred since 1859 inclusive up to the late outbreak :—

	Disease.	No. of Cases.
1859.	Fever	2
	Diarrhœa	2
	Diarrhœa and debility	1
	Total	5
1860.	Deaths from fever	0
1861.	Typhus fever	1
	Typhus fever	1
	Typhoid fever	1
	Total	3
1862.	Fever (in April)	1
	Fever and delirium (in August) ...	1
	Total	2

Unfortunately, I did not learn exactly how many of these fatal cases belonged to the *village*, but the registrar assured me that the *majority* of them had lived there. Thus we may safely conclude that fever was for years past lurking about the village, and it is unnecessary to suppose that the disease had been introduced from without, which was the prevailing opinion of the place. In the second place, the drainage, of which the inhabitants were so proud, was most defective; not only inoperative, but positively, I believe, mischievous. Little communication existed between the houses and the street drains. In many cases the slops were thrown on to the ashpits, which were most offensive. In other cases a brick had been removed from a wall in the houses, by which means a hole is made for the slops to be washed through; this trickles down the wall and across the street into the nearest gully. When not required as an outlet, the hole is closed by foul rags. To one block of cottages belonged two open boxes purposely contrived to receive

the filth of the neighbouring cottages; they stood close to the roadside, and were full of a stagnant, stinking fluid. Open cesspools and privies prevailed throughout the village, and in some cases were much too close to the houses. The general arrangement of the cottages will best be explained by a few extracts from my notes.

1. Ann Hardwicke and her bastard baby, ill in bed with diarrhœa, pain in the bowels, hæmorrhage, slight delirium. Six weeks before, the woman's mother had been ill with diarrhœa and fever. To this and three or four adjoining houses belonged a privy, which stood perhaps twenty yards from the dwellings, and communicated with an open pit, the margin of which for about a foot was thickly coated with foul decaying organic matter, the overflowings of the pool in wet weather. Between the houses and privy was a strip of ground occupied by dung-heaps and ashpits, the latter of which were full and offensive.

2. Sarah Bandy, ætat. 19. Ill three weeks; great diarrhœa, prostration, and delirium; a few rose-spots on the belly. She lay in a room that contained 1522 cubic feet, and was occupied at night by (besides herself) her father and mother, her bastard child, two young men, her brothers, and her two sisters, each with a bastard child—ten persons in all. A few weeks before, thirteen persons had slept in this room. Her father and one brother had had the fever. An enormous dung and ashpit leant against the cottage. The pit used to hold water; but on the outbreak of fever this was obviated by making an underground drain, that ran into a cesspool a few yards off, thus opening a communication between the house and cesspool.

3. Pease. A very dirty family. Three years ago a daughter had died of fever, and they had had fever again this time: *the clergyman was of opinion that the fever began in this house.* Six persons slept in the one bedroom, which contained about 1200 cubic feet of space, and was foul and close. This cottage was one of *five* in which forty-eight people lived; each cottage possessing one bedroom. There was but one privy for six cottages (fifty people), and this was half a dozen yards from Pease's back-door. The floor of this place was so covered with mouldering ordure, that it was impossible to approach the seat. The people told me they defecated in their gardens, and one man pointed out a heap of human ordure which crowned his dungheap at the very threshold of his door. In one of these cottages lay, in one room, two young men and a woman ill of fever.

4. A cottage in which lived two sisters, each with three bastard children. They had most of them had fever. A pond washed one side of the cottage, and into this pond was poured sewage from a neighbouring house and farm-yard.

In addition to these causes of typhoid fever may be added the *rabbits* that were kept by a large number of cottagers in their small ill-ventilated houses; and the pigsties close by, which were often without drains, beyond an open gutter that ran up to the dwelling-house. In some places the stench from this cause was very great.

Street drains prevail throughout the village, but owing to carelessness or deficiency of water they were imperfect, and foul gases issued from many of the gullies. Two outlets have been constructed for the sewage of the village, so far as it is conveyed by the street drains. In one case the drain opened at the back of some cottages into a ditch, where lay a stagnant pool of filth, and was continued as an open sewer for a quarter of a mile to the wood already mentioned. The drain at the other end of the village is closed in in its whole course, but connected with it is an open ditch, containing stagnant filth which runs for about forty yards by the road-side, and is connected by pipes with adjoining cottages.

Thus much for the drainage of Wing.

The *water* supply was dependent upon land springs, collected in wells dug through the sand and gravel of the surface to the clay beneath; as was to be expected under these circumstances, the water was impregnated with much organic matter. I made an analysis of three samples; the purest contained twelve grains, and the least pure ten grains, of organic matter in a gallon. An impression prevailed among the medical men and others that the over-crowded state of the cottages had produced, or at best encouraged, the fever. I consequently measured several rooms, and found that 100 to 150 cubic feet was the ordinary space allowed an individual. Few houses had two bedrooms, and no bedroom that I visited had a fireplace, the windows were moreover small. Many of the cottages were dirty, and wanted white-washing. The wretched internal accommodation of these homes is loudly proclaimed in the fact that 13 per cent. of the births are illegitimate, being double that of many English towns and villages.

Enough has now been said to show that the ordinary cause of typhoid fever, namely, bad drainage, was abundantly present in Wing; and the fever once started would be encouraged by the impure water; the over-crowded, ill-ven-

tilated, and dirty rooms; and an insufficiency of latrines. The only question that remains to be answered is—Whence did this fever start? Was it self-generated, or was it imported? Let us look at the habits of the people—a labouring, straw-plaiting population; the more restless and active among them leave their crowded homes during the best part of the year to find work in London or elsewhere, and only return to Wing in the winter, when work is scarce. It is easy then for one of them to have imported the fever. Did they do so?

The clergyman to whom I put the question, said "Yes." I believe one of them did. This was a young man belonging to the family Pease, already mentioned. It appears that the young man had returned home sickly in the autumn, that in the course of three weeks or a month he had undoubted typhoid fever, that other members of the family had it, and that it had been especially prevalent around his house, and in the street in which he lived. If it could be shown that the illness with which he returned home was fever, and that no case of fever existed at that time in the village, or had existed for some months, then it might be considered as satisfactorily established that this young man had brought fever into the place. But neither of these facts is forthcoming.

There is no evidence whatever that the man was suffering from typhoid fever when he came home. He looked sickly, and was not fit for work, but there were no symptoms that pointed to fever, nor did he know that he had been in a fever district, neither can it positively be shown that his was the first case of fever. There had certainly been a case of fever in the neighbouring hamlet of Mentmore, and the medical men thought there had been one or two cases in the village as early as the case of this young man Pease. But of this they were not sure, though all agreed that fever appeared, if not first, certainly almost the first, in this cottage, and had spread hence to the surrounding houses. No other evidence of the importation of the fever was offered. Now, if we adopt the opinion that the fever was self-generated, how are we supported by facts? A violent epidemic of typhoid fever burst out at Wing; the place is full of such nuisances as lead to its development; when its origin is attempted to be traced, the clergyman of the place, devoid of all knowledge of the theories on the subject, pronounces it as his opinion that the fever had originated in a cottage which I have already described as proverbially filthy, where fever had in the last

three years proved especially fatal, and where on the present occasion the first person attacked was a young man in delicate health, who had lately arrived at the house, and was consequently peculiarly susceptible to the poison. Though there is some doubt as to this having been the first case, it is allowed on all hands to have been one of the centres from which the fever emanated, while there are no facts whatever to justify the opinion that the fever had been introduced by the new comer.

I do not wish to lay more stress upon this view than the facts will bear, but the circumstance of this young man being laid up with fever, soon after his return home, suggests a cause for the great prevalence of the disease during the past months. The greater liability of *recent residents* to contract typhoid fever, combined with the extraordinary mildness of the winter, offers the explanation. In an ordinary year typhoid fever has disappeared before the men, who have been seeking their fortunes abroad, return home. In the present year the warm weather encouraged the exciting cause to linger in the village, until those who would be most susceptible of it were present.

Many of these men without occupation at home were among the sufferers; and not only did they suffer themselves, but by adding to the crowded state of the cottages, and aggravating the want of proper accommodation of all sorts, they caused the concentration of the poison (which would have been diluted by fresh air), and thus they aided the spread of the disorder.

I have nothing further of my own experience to state concerning this outbreak of typhoid. It may, however, be a satisfaction to the members of the society, interested as avowedly it is in the prevention of such disorders, to know that, at the instigation of the Privy Council, this neglected village is in a fair way to become worthy of the rich man who is most interested in its welfare.

I learn from Mr. Ouvry, the clergyman, that wells have been sunk to a depth of fifty-five feet; that the surface springs have been carefully excluded; and that a plentiful supply of good water is now obtained. Other nuisances mentioned in the foregoing paper have been abolished, and no fresh case of fever has occurred for two weeks.

REPORT OF THE TRIAL OF SARRACENIA PURPUREA, OR THE PITCHER PLANT, IN SMALL-POX.

By J. F. MARSON, F.R.C.S.,
SURGEON TO THE SMALL-POX AND VACCINATION HOSPITAL, LONDON.

[*Read June* 1, 1863.]

A COMMUNICATION, seemingly of great promise, from Mr. Chalmers Miles of the Royal Artillery, was read sometime since before a meeting of this society, on the use of sarracenia purpurea in small-pox. The specimens of the plant which accompanied the communication were submitted to me for trial at the Small-pox Hospital, the root being the part of the plant particularly recommended for use.

The public generally and the profession ought to feel very much obliged to Mr. Miles for the great trouble he took in bringing the subject before them. And although I shall not, unfortunately, be able to report favourably on the use of this plant in small-pox, I feel that Mr. Miles is just as deserving of our thanks for the great trouble he has taken, and for the expense I have no doubt he has been put to in gaining the particulars stated in the communication in question, as if the remedy had succeeded ever so well.

The root was said to be the part of the plant that, when made into a decoction, afforded the best form of giving the medicine. There was about enough for three persons only in the canister transmitted by Mr. Miles to this country from Nova Scotia, and given to me. I had, therefore, to make up my mind what were the most desirable cases of small-pox to test its efficacy in. I fixed on, first, a malignant case, one of those attended with hæmorrhage from the mucous surfaces; second, a severely confluent case, such as my experience has taught me usually dies, owing to the great amount of eruption; and third, if possible, a corymbose case, one of those rather rare and nearly always fatal cases of small-pox.

To give the remedy a fair trial, it was necessary to have the cases on which to try it in the early stage of the disease, during the first few days of eruption.

There was but little small-pox in London at the time the

plant was first submitted to me for trial; and, although I was on the watch for such cases as I have mentioned, several months elapsed before I had a suitable opportunity of trying the efficacy of the alleged remedy. Of course, I wished to meet with the cases I had fixed on free from any suspicion of their having been vaccinated; this was absolutely necessary, because I know what great influence vaccination has in altering what may be called the normal course of small-pox by modifying it. After several disappointments, unnecessary further to detail, small-pox became epidemic in the autumn of last year, and the opportunities became numerous of trying the sarracenia.

About the same time Mr. Miles returned to this country, and he was good enough to write to me and place at my disposal any amount of the sarracenia I might require, to be forwarded through the agency of Messrs. Savory and Moore.

I tried the decoction of sarracenia made from the root by simmering an ounce in a pint and a half of water for four hours, until reduced to a pint; and a quarter part was usually given for a dose twice a day, for two days or more. I also gave in some cases the liq. sarraceniæ supplied by Messrs. Savory and Moore. In all, fifteen patients have been treated with the sarracenia, selected for their severity, as I have described; such cases as I believe would not get well under ordinary treatment. They have all died.

The cases were selected on admission in the early stage of the disease, on account of the severe symptoms manifested, and because I felt it was of no use to try the efficacy of the sarracenia on mild cases, or vaccinated cases, that I knew very well would recover without anything being done for them beyond the ordinary care of such cases, by giving salines if required, occasional aperients, and suitable diet, etc.

I cannot say that the sarracenia had any effect whatever. It did not save life; it did not modify in the least the eruption of small-pox; it did not influence any of the secretions; it did not increase the secretion of urine; in only one instance it seemed to act on the bowels, this seeming effect might, however, easily have been from other causes.

The particulars of the fifteen cases taken daily at the time of the trial of the sarracenia are appended to this report; they would be, perhaps, rather tedious to the members of the society for me to read them now in detail, but I will run over two or three of the cases to show how the notes were taken.

Two cases have been admitted into the hospital that had

taken a decoction of the leaves and stems of the sarracenia before admission. The first, a very mild case, having four vaccine cicatrices, was highly modified, I believe, by the vaccination. The second case was confluent, was without vaccination; not severely confluent, and was wholly unmodified. They both recovered. The recovery might, perhaps, by some be attributed to the sarracenia, but I believe it had nothing to do with it. The vaccinated case was, as I have said, very mild, due, I believe, to the vaccination. As to the second case, about half our confluent unvaccinated cases recover with ordinary treatment.

In conclusion, I may state, that had I found the sarracenia do any good I should have taken an earlier opportunity of reporting the fact to the profession. As it failed I thought it well to defer this report, that others might without bias try the plant during the present epidemic of small-pox, and favour us with their opinion of its reputed power of controlling the course of small-pox in its severe forms.

Appendix.

Cases of Small-pox treated with Sarracenia, 1862.

1. Margaret Clayton, 18 years of age; small-pox, confluent, with menorrhagia; unvaccinated; was admitted into the Small-pox Hospital Oct. 8, 1862. Fourth day of illness, second of eruption. Took a quarter of a pint of the dec. sarraceniæ at one o'clock at night, Oct. 8, and a quarter of a pint, in two doses, the following day. She would not afterwards take any more, and died Oct. 12th.

2. Mary Ann Berkeley, 11 years; small-pox, malignant; unvaccinated; admitted Oct. 22. Fourth day of illness, second of eruption. Took two ounces of the dec. sarraceniæ, made from that sent by Messrs. Butler and M'Culloch, every six hours until the pint was consumed, beginning on the day of admission. Died Oct. 25, in the evening; seventh day of illness, fifth of eruption.

3. John Maddox, 11 years; small-pox, confluent; unvaccinated, admitted Oct. 22; fifth day of illness, second of eruption. Took the same evening two oz. dec. sarraceniæ (Butler and M'Culloch), and continued it every six hours until the pint was consumed. Died Oct. 28; eleventh day of illness, eighth of eruption.

4. Elias Hook Folson, 48 years, a machinist, from Massachusetts; small-pox, confluent; unvaccinated; admitted Nov. 6; eighth day of illness, fifth of eruption. Took the dec.

sarraceniæ, that sent by Mr. Miles, in quarter pint doses, beginning the day of admission, twice the following day, and one dose the succeeding day. Died Nov. 13; fifteenth day of illness, and twelfth of eruption.

5. John Hutchings, 18 years, baker; small-pox, confluent; unvaccinated; admitted Nov. 18; fifth day of illness, second of eruption. Began the dec. sarraceniæ the following day. Took two quarter-pints one day, and two quarter-pints the following day. Died Nov. 25; twelfth day of illness, ninth of eruption.

6. George Dedman, 25, labourer; small-pox, confluent; unvaccinated; admitted Dec. 2; fifth day of illness, third of eruption. Began the dec. sarracenia same day, took one dose quarter-pint, two doses following day, and one the next. Died Dec. 10; thirteenth day of illness, eleventh of eruption.

7. William Blake, 17, baker; small-pox, confluent; unvaccinated; admitted Dec. 3; fifth day of illness, second of eruption. Began the dec. sarraceniæ next day; took two quarter-pint doses, and the remainder the following day. Died Dec. 20; twenty-second day of illness, and nineteenth of eruption.

8. Charles Baldock, 19, footman; small-pox, confluent; unvaccinated; admitted Dec. 11; fourth day of illness, second of eruption. Began the dec. sarraceniæ Dec. 12 and took the pint on that and following day, continued it through another pint, and died Dec. 21; fourteenth day of illness, twelfth of eruption.

9. John Jones, 25, draper's assistant; small-pox, confluent; vaccinated in South Wales in infancy, no cicatrix. Began the dec. sarraceniæ the following day (Dec. 12); admitted 11th; seventh day of illness, fifth of eruption. Took the pint of decoction during the two days, 12th and 13th Dec., and continued it through another pint. Died Dec. 15; eleventh day of illness, ninth of eruption.

10. John Zambra, 33, confectioner; small-pox, confluent; vaccinated near Como, one indifferent cicatrix; admitted Dec. 11; second day of eruption. Began the dec. sarraceniæ Dec. 14, and continued it to a double dose, two pints. Died Dec. 18; eleventh day of illness, ninth of eruption.

11. James Harvey, 21, labourer; small-pox, confluent; unvaccinated; admitted Dec. 19; sixth day of illness, fourth of eruption. Began dec. sarraceniæ same day. Died Dec. 28; fifteenth day of illness, thirteenth of eruption.

12. Thomas Underwood Josslyn, 22, draper's assistant;

small-pox, confluent; unvaccinated (cut twice for cow-pox in Essex without effect); admitted Jan. 19, 1863; eighth day of illness, sixth of eruption. Began the day of admission with a drachm of liq. sarraceniæ every four or five hours—a drachm being stated to be a full dose. Took three bottles, in all an ounce and a half of the liq. sarraceniæ; no effect. Died Jan. 24; thirteenth day of illness, eleventh of eruption.

13. Ann Oliver, 30, barmaid; small-pox, confluent, hæmorrhagic; vaccinated at Lymington, two indifferent cicatrices; fifth day of illness, third of eruption, Jan. 24. Began the following day with a drachm of liq. sarraceniæ every four or five hours. Took an ounce and a half of the liq. sarraceniæ. No effect. Died Jan. 28; ninth of illness, seventh of eruption.

14. Thomas Couchman, 35, stone sawyer; small-pox, confluent; unvaccinated; admitted Jan. 31, 1863; eighth day of illness, sixth of eruption. Began the liq. sarraceniæ day of admission, one drachm for a dose every five or six hours —took six drachms. Died Feb. 5.

15. James Underwood, 39, labourer; small-pox, confluent; unvaccinated; admitted Jan. 31; sixth day of illness, fourth of eruption. Began dec. sarraceniæ, same day; took six drachms. Died Feb. 5.

Note.—The second and third cases only took the decoction of sarracenia supplied by Messrs. Butler and M'Culloch, a mixture of root, stalks, and leaves. All the rest of the cases took the sarracenia first sent by Mr. Miles, or that supplied at his request by Messrs. Savory and Moore.

ON AN EPIDEMIC OF JAUNDICE AT ROTHERHAM, IN YORKSHIRE.

By Dr. WILLIAM ORD,
MEDICAL INSPECTOR FOR THE PRIVY COUNCIL.

(*Read July 6th*, 1863.)

Rotherham and Kimberworth form together one large town, intersected by the River Don, and containing, in 1861, an aggregate of 18,922 souls. The staple industry is the manufacture of iron. During January and February of the present year, after a period of great unhealthiness, chiefly characterised by an outbreak of typhoid fever, many persons living in the townships or their neighbourhood have been affected by an illness of which jaundice is the most prominent symptom. From returns furnished to me on the spot, in February, by the different medical men of the town, the cases coming under treatment appear to have been about 200 in number; but there are many cases for which medical help has not been sought, and the number of these may be approximately estimated at 100. One death is attributed to the disease.

The following account of the symptoms of the illness is based upon information communicated by medical men, and upon notes of cases personally visited. The attack usually commences with some disorder of digestion,—flatulence, loss of appetite, nausea, or vomiting; vomiting occurs in about half the cases. These symptoms are often introduced by shiverings, and are always accompanied by languor and depression. In many cases there are also distinct catarrhal symptoms, patients feeling "as if they had a cold," with relaxation of the throat, and frequent accumulation of mucus in the fauces. Almost at the same time pain is felt in the epigastrium, together with a feeling of fulness and distension, and with distinct tenderness. Similar conditions affect, with less frequency, the right hypochondrium. After these symptoms, which are unaccompanied by febrility, have lasted for a few days, they abate; and, at periods varying from two days to a fortnight after the first commencement of illness, the tint of jaundice appears in the sclerotics, and spreads over the body; the urine is deeply tinged with bile, and the alvine evacuations are pale or colourless. In the milder cases, the tinging of the urine is often the first indication of

the nature of the illness. The liver does not appear to become enlarged, or notably tender on pressure; in fact, there is often no tenderaess at all. But the epigastric tenderness remains, and one of the medical men, Dr. Clarke, informed me that in two cases he had felt, projecting from under the edge of the liver, what he believed to be a distended gall-bladder. The tongue is more or less white and coated; the bowels act irregularly, being more commonly constipated than relaxed; and diarrhœa, if assuming a bilious character, often gives much relief. In some cases exhibiting the symptoms usually ending in jaundice, the occurrence of a sharp attack of such diarrhœa appears to have averted the disease. This stage is, like the first, unattended with febrility, and the constitutional affection is so mild, that only a few patients are confined to their beds, while many pursue, in-doors and out of doors, their usual employments. The jaundice lasts, generally, from one to three weeks, after which, with or without remedies, it gradually disappears. The single case in which death is attributed to the jaundice, is that of a woman who was seized with the disease a few days before her confinement, and died comatose two days after that event. There is reason, from the experience of other recorded epidemics of jaundice, to connect the death with that disease. And, in the present epidemic, the effect of the disease upon pregnant women has been remarkable. In six cases abortion or premature delivery has been produced.

Age appears to have some influence. The proportion of persons under twenty years of age attacked by the disease is very small; but among the exceptions are some children. It appears probable that intemperate habits increase the liability of persons to the disease. Neither locality nor occupation appear to affect the development of the disease. The attacks have been scattered over all parts of the town, good and bad, and among all classes.

No facts connecting this epidemic with the typhoid fever, which was prevalent in the townships in 1862, exist. Of twenty-seven cases of jaundice reported by Mr. Crowther, one of the medical men of the town, only two had had fever, and I was informed that the experience of other medical men was similar. Where jaundice has occurred in houses previously affected by fever, those inmates who had suffered from fever escaped the second epidemic.

Jaundice does not appear to have spread by infection. I heard of no instance in which it had attacked a whole household; generally only one or two persons have suffered in one

house, and there has been no spread of the disease from house to house.

In the absence of information derivable from the examination of the bodies of persons having died from the jaundice, opinions as to the nature of the disease can rest only upon the symptoms. Dr. Reid, one of the medical men of the town, considers the disease to be a form of yellow fever. Other gentlemen consider that the liver is the seat of the disease; and others again think that the jaundice is produced by obstruction of the common gall-duct, consequent upon duodenal or gastro-duodenal catarrh. The last opinion appears to me most in accordance with the symptoms. On the one hand, the prominence of the epigastric pain, the early gastric symptoms, the absence of enlargement or tenderness of the liver, and the occasional occurrence of catarrh affecting the commencement of the alimentary canal, point to an intestinal rather than a hepatic origin of the disease; and, on the other hand, the absence of pyrexia, constant, remittent, or intermittent, added to the fact that the disease has prevailed in cold weather, is opposed to the idea of the disease being yellow fever. The detection of an enlarged gall-bladder in two cases is further evidence in favour of the view above supported.*

On a second inspection of Rotherham, in April, I found, from information given me by the medical men of the town, that the epidemic was declining. About fourteen persons were then under treatment for this disease, and the number of affected persons who were not in receipt of medical aid was probably equal, and perhaps greater. No change in the nature of the symptoms was reported, but I have to add to the enumeration already given the fact that, in most cases, a slight amount of febrility is noticed during the first days of an attack. The febrility did not appear to exceed that which accompanies the earlier stages of any acute catarrh, and was of short duration. In connexion with attacks of jaundice, three more cases of premature confinement were reported, in one of which death by coma occurred on the third day.

The distribution of cases had received particular attention on account of its bearing upon the probable cause of the epidemic. Dr. Hardwicke, Medical Officer to the Local Board of Health, having observed that a considerable number of

* It is proper to mention that the views of Professor Frerichs, which are chiefly adopted in the text, have been vigorously controverted by Dr. Harley, of University College, London, who considers that the seat of obstruction in similar cases is the liver itself; not the intestines or the common bile duct.

the cases coming under his care occurred in low-lying places near the river, considered that the jaundice had probably been produced by malaria arising from the banks. He stated that early in the year three floods occurred in the river, at short intervals, and were followed by unusually warm weather. At ordinary times the river in many places only occupies the central portion of its bed, leaving large stony surfaces at the sides, which are covered only during floods, or after long continued rain. To the action of the warmth upon these surfaces, when covered with mud after the falling of the waters, he charges the production of malaria. But the experience of the other medical men is not to the same effect; their cases having been scattered in all parts of the town, on the high levels as well as on the low. There are certainly no foci of jaundice-production, no defined spots, in which cases have been more thickly grouped than elsewhere. On the other hand, it appears that epidemic jaundice is chiefly confined to Rotherham, and the immediate neighbourhood. In some instances persons residing in towns a few miles off have been attacked with jaundice after a few days' residence in Rotherham, and some of the cases occurring in the surrounding villages may possibly be explained by the fact that the persons attacked had recently been exposed to the atmosphere of Rotherham. But this explanation fails in some instances. Three children, residing in a farm-house near Whiston, a village two miles distant from Rotherham, were among the first attacked. I visited the place, and found that they had not been in Rotherham for some weeks before their seizure. The house, which is roomy and well-built, lies near a small brook, tributary to the Rother, and often overflowing its banks in winter. A servant belonging to this household was afterwards attacked under similar circumstances. Having heard that jaundice was unusually prevalent in Sheffield and Doncaster (both towns on the Don, one above and one below Rotherham), I made special inquiry in both places of medical men in large practice. They stated that jaundice, though not absent, was not more frequent than is usual at this time of the year.

The cause of the epidemic is probably to be found in the condition of the atmosphere of the town, and especially of the atmosphere of dwellings.

1. There is reason to believe that the atmosphere is seriously polluted by exhalations from the river and its banks. They are said to be often highly offensive, particularly at night and in still weather.

2. From the obstructed condition of certain drain-pipes which have been taken up and examined, it may be inferred that, owing to insufficiency of flushing-water, the smaller pipes are in other places similarly obstructed. In addition to the pipes seen on a previous occasion, a six-inch pipe from Dr. Shearman's residence was shown to me. It was completely blocked with a hard deposit of sewage and surface-washings, although the house is situated on a hill-side, with an excellent fall. Where pipes are thus obstructed, the ground near and above them becomes, in process of time, a diffused cesspool, the gases from which have often but one outlet, the sink-holes in houses. The contamination of the air of dwellings by gases rising through sink-holes was specially noted on my first visit; and, on the second visit, many instances were found in which the stinks thus flowing into the lower rooms were most offensive. In one house quick lime was piled round the sink hole, and damp cloths were frequently found placed over the orifice to keep away the effluvia. In several parts of the town, especially in the lower parts of Masborough, drains were evidently choked, and the surface around the openings into them was sodden with slops and refuse.

The drinking water, according to an examination made by Dr. Miller, appears to be not altogether free from organic impurities. In consequence of the dry weather the daily supply is diminishing.

At the beginning of May, just when the jaundice appeared to be declining, diarrhœa, not indeed of great severity, affected a large number of persons in Rotherham. If the opinion that the jaundice is produced by a gastro-intestinal catarrh obstructing the biliary ducts be correct, three maladies, all chiefly consisting in affections of the intestinal canal, have occurred successively in this place during the last ten months. The typhoid fever which preceded, and the diarrhœa which seems likely to supersede the jaundice, being both of them diseases which are known to be produced by such impurity of air as is above described, the jaundice may with fair probability be referred to the same cause. The nature of the alteration in the symptoms suggests that a lower tract of intestine is now attacked by the poison. Such succession, without interval, of epidemic malady to epidemic malady, marking the constant operation of influences detrimental to health, demands the most sedulous care in the removal of all obvious sources of atmospheric or other pollution.

There are on record a few instances in which jaundice has been epidemic. In five out of eight recorded epidemics the jaundice was associated with intermittent or remittent fever, or with spasmodic affections and febrile delirium, and was very fatal to life. In the remaining three the jaundice constituted the most prominent symptom of the disease, was not accompanied by fever, and, except in connexion with pregnancy, was not destructive to life. The last-mentioned epidemics appear, from the accounts of them, to have resembled in most particulars the Rotherham jaundice.

The first was at Ludenscheid, and is reported in *Hufeland's Journal* by Dr. Kerksig. The epidemic occurred in autumn after a very warm summer, followed by very changeable weather, with rapid alternations of high and low temperatures. The symptoms were at first those of gastric catarrh, disordered digestion, nausea, vomiting, etc., and the jaundice appeared at the end of eight to fourteen days. The stools were pale, and there was no fever. Of seventy persons who were attacked only three died; one man, and two women who died after abortion. Five pregnant women were affected with jaundice; of these, three aborted, and two being attacked afterwards with fever and delirium, died. Children were to a great extent exempt. Associated with this epidemic was an unusual prevalence of bilious diarrhœa and bilious fever.

The second was at Chasselay, on the Saone, in France. It commenced in October 1841, after several days of thick foggy weather, in a healthy locality. The characteristics of this outbreak were the occurrence of depression, loss of appetite, præcordial distress, pain in the epigastrium, and hypochondrium, followed by the development of the icteric tint, and considerable digestive derangement, without any notable febrility. The chronicler, Dr. Chardon, observes that the disturbance of the general health was in many cases so slight that, excepting the fact that patients were jaundiced, they would not have known that they were ill. The stools were pale, and the urine loaded with the principles of bile. Most of the persons attacked were adults, but the total number is not given. The epidemic lasted three months, and no one died of it. The disease yielded to simple treatment.

The third epidemic occurred at Martinique in the year 1858. Dr. Saint-Vel, who reports it, asserts that generally jaundice is not more common in the Antilles than in France, and that there could be no link between the epidemic and

yellow fever, inasmuch as there had been no prevalence of the latter disease in Martinique since the middle of the preceding year. The jaundice appeared in April, was most severe in June and July, and lasted on to the end of the year, making the tour of the colony. It was not associated with any climatic disturbance. It affected all races, adults more than children. Dr. Saint-Vel does not mention any symptoms as attending the jaundice, but states expressly that there were no complications on the side of the liver, and that there was no fever. He considers the disease to have been pure jaundice, *ictère essentiel*. The termination was constantly favourable, except in relation with pregnancy. The only deaths were among women. Three young girls, not pregnant, and one old maid of sixty died of the jaundice; besides these, only pregnant women were the victims. Of thirty pregnant women who were attacked only ten survived; the remainder died comatose after abortion or premature confinement. "There was only one serious form, always the same, always mortal, the comatose form." All the children in these cases died, with one exception. They were not jaundiced. No post-mortem examinations were made.

The general symptoms in the first two epidemics resemble very closely the symptoms observed at Rotherham. Professor Frerichs, who quotes the two cases, indicates them as, probably, instances of jaundice dependent upon gastric catarrh, differing only from the cases commonly met with in their greater extension.

In the third instance there is the same absence of fever and of severe constitutional disturbance, but there is no special account of attendant symptoms, excepting in regard to the effect of the disease upon pregnant women.

THE PRESENT POSITION AND PROSPECTS OF EPIDEMIOLOGICAL SCIENCE:

BEING THE OPENING ADDRESS OF THE THIRTEENTH SESSION OF THE EPIDEMIOLOGICAL SOCIETY.

By BENJAMIN W. RICHARDSON, M.A., M.D.

[*Delivered Nov. 2nd*, 1863.]

MR. PRESIDENT AND GENTLEMEN,—My first duty is to thank you for the distinguished honour you have done me, in inviting me to deliver the introductory address of this the thirteenth session of the Epidemiological Society. My second duty is to congratulate the Society on the continued success with which its great labours are conducted, and on the increasing interest with which those labours are observed and studied by the intelligent members of the general public both here and abroad; by governments not less than by peoples.

I have before me yet a third duty, more difficult and more important; I have to select a subject for my address this evening, that shall in some degree be worthy of the occasion; and that shall, in however poor a light, approach those addresses which on similar occasions, in previous years, have been delivered from this place.

If I have, even for a moment, hesitated in the selection of a subject, surely that hesitation has not arisen from any paucity of materials. A speaker who, without moving from the strict letter of his license, has the opportunity of treating on those diseases from which one-fourth of the death-stricken members of the community meet their end; diseases which, read according to our present knowledge, or perhaps I had better said, our present ignorance, appear as they list, so that we can scarcely say whence they came and whither they go; diseases which, avoiding, as if by some special law, the bowed head and grey locks of old age, seize on the youngest members of the world's family, and tear from our hearts the dearest of our ties—those for whom we would willingly die!—a speaker, I say, who has such subjects for his theme has certainly no lack of opportunity, no want of scope; he

may be scientific to the profoundest of depths, pathetic to tears, eloquent to fury, learned to madness, and, in the end, have so much of substance left before him for disquisition, that it shall stand as a pedestal of granite over which his bare fingers have but feebly been drawn. No! it is the very richness of the matters in hand that renders the choice of selection so arduous and refined.

There is, however, a saying of the great Lord Bacon to this purpose: "*The past deserves that men should stand for a time upon it, to view around which is the best way; but when the discovery is well made they should stand no longer, but proceed with cheerfulness.*" This observation supplies me with a text for the present discourse. Instead of tracing out in historical detail the epidemics of the past year, instead of plunging deeply into statistics, which, in my judgment, have been carried in respect to epidemics to the extremity of their present application, I shall prefer simply to make an attempt to stand, for a brief half hour, on the past of our knowledge; to sketch forth, as far as I am able, the realities that lie at our feet; and then to try to point out the road that seems most direct to the great end for which our Society was founded—by that gentle-hearted, earnest man, who, though removed from us, is not forgotten—the prevention, wholesale, of the pestilences of the earth.

Ascending to our vantage ground, and looking at the prospect before us, dividing the known from the unknown, we discover, as a primary fact, that at last we have arrived at a definition almost absolute of each of the diseases of the epidemic class. We know, that is to say, all the forms which occupy our sphere of thought, as clearly as the astronomer knows the number of planets in his solar system. Such knowledge may be considered as exact; and the possession of it, the work of ages, common-place as it has become, is by no means a contemptible progress.

And yet, with us, precisely as with the astronomer, our chart has one or two gaps in it that require to be filled, and one or two doubtful points that require to be cleared up. For instance, between scarlatina and measles there lies a disease which has yet not been perfectly defined, nor positively named. By some of the older writers, this disease has been called *roseola*. Dr. Ross has depicted it as a *spurious urticaria*. I have myself designated it as *idiopathic rosalia*. Regarding this variety of disease, we have yet to wait to be confirmed in many points; we require to know whether it be a specific disease, or but a modification of those

other diseases to which it seems to be allied; whether it be a contagious disorder, or whether it spring from some passing cause, an error in diet, or an exposure to peculiar atmospheric variations. We have also yet to determine the actual differences that exist between the various forms of "typhous" fevers, and on such decision we have to base a new nomenclature. For if it be true, and I for one believe it to be true, that typhus and typhoid fevers are as distinct as Drs. Perry, Stewart, Jenner, and Murchison would make them, then the idea of a supposed alliance between the two disorders ought properly to be entirely discarded; while certainly any such classification as that which puts the two forms of disease under the one head of "typhous" should be set aside; for the diseases are either one or two; and if two, they are as removed from each other as they are each from small-pox or Asiatic cholera.

From the position I have chosen to take, we see next a very clear course opened, and still further opening, in respect to the mode by which diseases of the epidemic class are propagated. In this direction we have learned, as a firm and sure basis of further observation, the fact, that the true epidemic disorders are essentially specific, as a general rule, in particular classes of animals. We are cognisant of the law, that scarlatina is peculiar to man, or at most to man and the pig; that the small-pox of man is a disease itself specifically one; that the sheep-pox is peculiar to the sheep, and admits of transmission by no means whatever to any other known domestic animal, nor to man; that the pleuropneumonia of cattle, while easily propagated from one of the bovine tribe to another, is capable of no further transmission; and that measles, hooping-cough, and true Asiatic cholera, are peculiar to the human race. This knowledge of distinction of disease, according to animal, is not merely an interesting part of our researches; but an important practical lesson. It will assist, in a future day, to an immense extent, in clearing up questions of causation; in other words, it will enable the etiologist to explain the nature of certain poisons, by a process of reasoning based on the peculiar organisation of the animals in which the poisons are capable of producing special diseases.

Once more, the past reveals to us many approved facts in relation to the influence of season on certain formidable diseases. On this point, the statistician and the meteorologist have come most serviceably to our aid; and their results in their combined form are as safe as any others that are based

on arithmetical calculations. Thus, we know that in this country small-pox, hooping-cough, croup, and bronchitis, are most common in the months of January, February, and March, and least common in July, August, and September; that diarrhœa, dysentery, and jaundice, are most common in July, August, and September, and least common in April, May, and June; and that influenza, ague, remittent fever, typhus, scarlet fever, measles, erysipelas, and carbuncle, are most prevalent in the months of October, November, and December. Further, we have learnt, as a particular fact, that at least one disease, small-pox, which admits of transmission by direct inoculation, is checked in its course, even in this method of propagation, by the wet seasons of tropical climates.

These facts, although at the moment they are not explained, afford a solid ground-work of labour for the future inquirer. They represent so much work done; and so much added to the capital of our knowledge.

Again, we have determined, through the labours of Keith Johnston and M. Boudin, the geographical limits of almost all the great epidemical disorders; so that from any centre of the earth's surface the learned physician can turn to his map and tell the traveller, or the general, or the politician, with precision and readiness, what diseases will be met with in any other centre. We can say of diseases, they have their habitats and stations which we know. We can define cholera as living between its own lines, of 64 deg. north latitude and 21 deg. south. We know that yellow fever, though it has passed, has never spread, beyond the degrees of 48 deg. north and 27 deg. south latitude. We know that typhus stops nearly at the point southward, where yellow fever stops in its northward course; that in Western Europe it prevails between the parallels of 44 deg. and 60 deg. north, and in Northern America between the parallels of 32 deg. and 48 deg.; in districts, in fact, where the thermometer, as Mr. Johnston shows, has a range between 62 deg. and 40 deg., and nowhere else.

Lastly, we have learned that, according to elevation from the surface of the earth, diseases undergo change; that yellow fever, for example, never ascends a mountain above the height of four thousand yards, even in the tropical world.

In these facts, we have firm bases of learning, the importance of which we cannot too dearly prize. Our knowledge here compares handsomely with that of the physical geographer, navigator, natural historian, and botanist; nor

need we shrink from contest with these as to the point, who is most exact and sure in his information. Nay more, our acquirements in respect to these geographical matters, admit of immediate and useful application in the actual treatment of epidemics. For, if typhus will not exist above or below certain mean temperatures, there is a direct index, that in treating it the patient should not be allowed to lie in an atmosphere included in those temperatures; and there is, further, a direct index towards a series of inquiries regarding other epidemics, whether they too will not cease to exist above or below certain thermometrical degrees?

Lastly, I conceive that our ground is now tolerably safe in respect to the law that each disease, which we may venture to call specific and spreading, has for its cause one special poison. This supposed law of propagation, lately announced in Edinburgh by the most distinguished of its professors, Dr. Christison, has been almost universally recognised in this Society from its foundation. It is a theory which has been most energetically supported by Mr. Grove; it was always resolutely, and some even thought doggedly, sustained by Dr. Snow; it was one of the articles of faith of our ever to be lamented Dr. McWilliam; and, in truth, through all our debates, we have never once had it seriously called in question.* For my own part, I look upon it as the best, the soundest, and the most useful of facts in our science; as sufficient, when properly understood, to explain all the observed phenomena of epidemics; and, as a theory, as demonstrative and as satisfactory as that of the tides in physics, or of the atomic theory in chemistry. If I were asked for proof or demonstration, what better can be found in any science or philosophy? The one simple experiment of inoculation for small-pox, and of the direct transmission of the disorder from one person to another by this method, is instant proof that the germ-theory is acceptable. The en-

* The comments that have been made in the various journals on Dr. Christison's address, are somewhat startling to epidemiologists, and even painful, as indicating the haste with which criticism immediately falls, without due thought, on men of eminence and position. Dr. Christison, for instance, has been held up as the originator of the idea that mere bad smells are insufficient as causes of specific epidemic disorders. Of course, Dr. Christison was himself far too well read to assume any such position. Twelve years ago, for advancing the same views in the *British Medical Journal*, Dr. Noble of Manchester was criticised almost as severely. In the year 1855, Dr. Snow was attacked for the same reason, in consequence of his evidence before the Select Committee on the Public Health Nuisances Removal Bill. But in none of these attacks has there been any correct appreciation of the real question at issue.

grafting of a disease by inoculation, is not, in the abstract, different, in any respect, from the engrafting of a rose on a stem, or the planting of a seedling in the earth. When, therefore, we take the phenomena which follow the process of inoculation, and compare them with those which succeed from exposure of the body to small-pox virus without inoculation; and when, pushing the point further, we compare the results of exposure of healthy persons to those who are suffering from allied disorders, we have no alternative but to accept that one universal principle of causation prevails in epidemics; that each disease has its specific, organic, physical cause, which may not, it is true, have been discovered by the eye, but which exists nevertheless, and obeys the same influences of motion and rest, as other bodies more substantial and more readily demonstrable.

While, however, we stand firmly on this law, we require, for the benefit of the outer world, to give to it an interpretation which shall secure for it respect and acceptance. It is a law which, partially understood and dogmatically asserted, is apt to lead the mind away from paying attention to important details, and to produce mischiefs by default, that are not easily or momentarily remedied. It is the general disposition of most minds to be indolent in new and unpractised offices; it is the favourite bent, I believe, of nearly every mind to defend itself behind the inevitable, "What can't be cured must be endured"; "What is to be must be"; "When Jove commands we must obey"; "Let us eat and drink, for to-morrow we die." These are the daily solaces and sops with which the wisest of us fill our cups of life and pass them round. What, then, if there be poisons in this universe which are borne by every wind that will waft them; that may enter the system by the air we breathe unconsciously; passing, like right royal Mab,

"Athwart men's noses as they lie asleep"?

What if these poisons be invisible and inscrutable? Of what use, then, all care, all thought, all precaution, all so-called preventive measures?

In regard to this position of the question, we, who hold the view that these poisons are veritable and substantial agencies, are bound to meet the dangerous objections that are thus suggested, with firmness on the one hand, and argument on the other. The worst feature of the disputation on the side of the poison-theory is, to ride the fact too madly and to protest too much; and the worst feature of

the disputation on the other side lies in the same direction. To affirm that a bad smell is sufficient to account for any epidemic, is as unwise as it is to assert, that in no case is impurity of the air a necessary attendant on the cause which actually excites a disease of the communicable type.

Neither is it the right thing to say, that the truth lies in the midst of the two extremes; for the truth really lies in the special facts of each disease. On the right hand we see the salutary influence of preventive measures on the largest scale; we see districts in which, while they were still uncleansed, every epidemic disease was rampant, and in which the mortality was twenty-three, twenty-four, and even twenty-six per thousand, become, under the hand of the sanitary reformer, largely freed from these disorders, and the mortality reduced to twenty, or even to seventeen per thousand. Again, we observe certain pests, such as jail-fever, wiped entirely away from their old habitats purely by cleanliness, fresh air, and proper food. These are sterling facts, and are not to be gainsaid. On the left hand we are met by these truths: that some disorders spread unaccountably in the most healthy districts; that scarlet fever, for instance, as I have elsewhere shewn, seems to be modified in its course by no ordinary external conditions, but may be as fatal in the palace as in the hovel; its contagious poison passing from one point of the earth to the other in temperate climates, irrespectively, as it would appear, of all conditions that lie outside. The same may be said of measles, of hooping-cough, of croup, of cholera, of typhoid fever, and perhaps of diphtheria.

We are unable, as candid men, who care nothing for pet views and fancies, and who do care for the steady, however feeble, ray of truth, to ignore either class of the facts propounded; but we must deal with them separately, and discuss each one on its own merits. I believe we are able to effect this object; I believe we stand on safe ground when we undertake and advance an analysis of all the evidence before us in its details; I conceive that no contradictory elements invade the argument; and I would, in a few sentences, endeavour to indicate how analysis unfolds the difficulty.

The admirable experiments of Dr. Barker on cesspool-air prove to us beyond the shadow of a doubt, that long inhalation of an atmosphere charged with the gases evolved from decomposing organic matter is capable of producing a set series of symptoms which constitute a disease. These symp-

toms are, increased heat of skin, thirst, irregular and feeble muscular contractions, and diarrhœa. The symptoms continue so long as the cause remains in operation. But it is to be observed that, when the cause is removed, there is no continuance of symptom, no recurrence or remittance, but a tendency towards recovery. No communicable disorder is induced. The poisons act for the time as chloroform might act, but they lay no hold on the tissues; they are negative poisons; and so soon as they are removed, so soon the affected organism returns to its equilibrium.

By the side of these experiments let us place the wonderful history that has been given to us by Dr. William Budd of the late small-pox epidemic among sheep in Wiltshire. There we see a district of country in which the air is of the purest; where for centuries the white flocks of the English agriculturist have roamed untouched by disease. There is here no cesspool-air, either to excite disorder or to exaggerate evil. But a little leaven of disease, through some infected animals from abroad, is let into that open spot; and straightway, in those plains, so healthy hitherto, there is a devastating sheep-pestilence. Now for the tests of science. There are sharp eyes watching the flocks; separating the sick from the healthy, and encircling the disorder. The result is, that the pestilence is at once put out.

I will not weary you with further details; but will attempt, while these two pictures are fresh on the mind, to draw the natural inferences to which they lead. In the first place, they indicate that an air charged with the gases emanating from organic matter during its ordinary decomposition, is capable of creating disorder, but not specific communicable disease. From this we may infer that cases of specific disease exposed to these gases become complicated by the nature of the air which the sufferer breathes, but not more; the precise symptoms which mark the communicable and specific disorder are still the same, in so far as they are developed, and, in themselves, run the same course.

Next, we are driven to allow that, under the best hygienic conditions, the specific poisons may produce a fatal catastrophe by virtue of their own action; by virtue of that action which differentiates them from the negative poisons; by virtue of that action which begins with this fact, that the poisons lay hold of the organism, enter into its composition, interfere with its natural actions, and destroy its integrity.

If, finally, we are asked, Why, then, do sanitary measures effect so much real good? Our answer is clear, decisive,

and simple. When the sanitarian improves the house, he improves the inmates. If into a dirty, dark, ill-ventilated, badly drained dwelling, an epidemic poison shall enter, and shall multiply there; there shall it remain long, because the conditions for its removal and its destruction are most unfavourable. In the better class of house, the house well aired, well lighted, well traversed with water, the poison has many exits, and finds them; in the opposite condition, it is neither burned nor buried; but rests for years ready to be distributed, and to afflict with its power any one who, susceptible to its action, is offered up to it as a victim.

In the agricultural districts of this fair country, in those hovels of our labourers, which call back to our minds the song of the sweetest of Roman poets, and tell us how, from the days of Cæsar until now, small has been the change, how contemptible after all, our civilisation; in every cottage of many villages, we see the very granaries of these poisons. In the thatch "*pauperis tuguri culmen*"—in the dust beneath the rickety floors—in the cracks of the miserable couch—in the mud wall—there they rest, and from century to century they remain, lost only in conveying to new generations fresh evils, and in becoming renewed for further transmission to generations yet to come.

Let us, then, as scientific epidemiologists, join hands with the sanitarian; let us not, for a moment, think little of his labours, nor breathe a breath that shall reduce them in the public estimation. Let us ask him simply not to embarrass his good work with untenable theories as to origins of disease; and, while we leave him to discover means that shall prevent the causes of twenty-four deaths *per cent.* from being harboured in human habitations, let it be our aim to second his efforts by subjecting these causes to more rigorous investigation; and by learning how, when in spite of every precaution they have been brought into action, they may be successfully met and neutralised.

Still standing on the past, we have two further facts before us, each of great importance and each very wonderful. The first of these is, that epidemic diseases belonging to certain classes do not, as a general rule, recur in the same person; and the second, that in one disease—I refer, of course, to small-pox—we have in our hands an almost certain prophylactic. These facts require no comment and no exposition; but they had to be included in our summary, or the researches of past labourers had not been fairly presented. When they are spoken all the *reliable known* is discovered.

From the land over which we have glanced, we must look next to the prospects that lie in view. Which way shall we go with cheerfulness, hoping for success? That is the question before us.

As it appears to me, there is promise of successful travel in three directions:

1. Towards a better knowledge of the sources of the poisons of the epidemic class.

2. Towards a more correct appreciation of the changes produced in the body by these poisons, and of the way in which they cause the destruction of life.

3. Towards a more correct view in respect to the modes that should be adopted to destroy the effects of the poisons in the living organism; in other words, the means of cure.

As regards the source of the poisons of the various communicable disorders, our attention ought to be very sharply and earnestly directed to the vegetable world. I think I may say that for ages past certain speculations have been afloat as to a connection between the existence of what are called fungoid vegetable growths and communicable spreading diseases; but within the last few years observation of a direct and practical kind has tended to transform the speculative into the real. In the year 1847 I myself made an observation, which was recorded in an inaugural thesis written for the Faculty of Physicians and Surgeons of Glasgow in 1850, and afterwards was reported at this Society in 1853, which had an important bearing on the question under consideration. The observation was to this effect. Three men who were working in a barn, thrashing corn, on arriving towards the close of their task were exposed to dust coming from the floor on which the sheaves of corn (wheat) had laid. At the moment of exposure to the dust, they were conscious of some unpleasant sensation, and soon afterwards were seized with rigors and signs of febrile disturbance, ending in each case in erysipelas of the face and head.

In commenting on these cases I suggested that it was possible the disease arose from the inhalations of some vegetable fungus pertaining to the straw; a view which the evidence supplied fairly supported.

From then until within the last two years, nothing occurred in medical science to sustain this view. At last, in 1862, an American physician, Dr. Salisbury, made a series of researches in regard to measles, which, in a singular, and, so far as they go, conclusive way, indicate that a disease

resembling this epidemic may have a direct origin from the vegetable world.

Dr. Salisbury's first observations were to the effect, that a disease known in armies as camp-measles, had its origin amongst some soldiers under his care in Ohio, from their sleeping on straw which was covered with the spores of a fungus, commonly known as "must." Believing that the disorder observed arose from the inhalation of these fungi, Dr. Salisbury, on February 11th, 1862, had the courage to inoculate himself in the arm with some sporules derived from wheat-straw similarly musty. The result was, that on the 15th the experimentalist was suffering from a disease in every respect analogous to measles. On the 19th he inoculated his own wife, with the same resultant phenomena; and ultimately he subjected his children to a similar process, also with like results. Further, he found that after one inoculation and production of the disease, a second inoculation took no effect.

In the present year, Dr. H. Kennedy, of Dublin, has recorded a case in which an affection closely resembling measles was induced in a youth from exposure to some musty flax-seed-meal, which, in a joke, had been thrown in the face of the patient, and which he had inhaled.

It is unnecessary for me to dwell on the immense importance of these observed facts. They open up obviously a new line of experimental inquiry, which it is the duty of our Society at once to follow out. If such diseases as erysipelas and measles can be induced by the inhalation of vegetable fungi, the inference is fair that other of the epidemic disorders have their first origin in a similar cause. In the virus of small-pox there are bodies which resemble closely the sporules of the yeast-plant. What would be the effect of inoculation with the sporules of the plant named? The fungi which form on moist bread and flour, what would they do if introduced into the blood? Various analogies seem to tell me that these bodies must exert in the organism an effect similar at least to the virus of common contagious disorders.

The second line of progress in which our steps should be directed has relation to the changes produced in the living body by the communicable poisons, and especially as to the mode in which these poisons destroy life. We are accustomed to speak of these poisons as ferments, and as exciting some kind of action analogous to fermentation out of the body. Regarding this hypothesis, which rests by the way

on no experimental proof, I must state that it is a question which this Society ought to subject to very rigid inquiry. Looking at the question from a physiological point of view, I am inclined to assume, although I would not be dogmatical, that the process is one in which the natural zymosis of the blood is perverted, rather than that there is a new and active zymosis established. As the phenomena are presented to me, we ought to consider that in health the respiratory constituents of the blood are at all times under the influence of the albuminous compounds, undergoing a natural fermentation; and that when foreign matter is introduced this normal change is checked, and a new series of products, marking a modified form of oxidation, are evolved. Whichever view be correct, the evidence all tends to the inference that the actual dangers of those epidemic diseases which present inflammatory symptoms—so called—are due to a peculiar modification of the fibrinous constituent of the blood, under which it proceeds to undergo separation, and to be deposited in the right chambers of the heart. In diphtheria, scarlet fever, measles, hooping-cough, croup, and influenza, I have many times proved, both by the symptoms that preceded death, and by the pathological findings, that the immediate cause of dissolution was unmistakably the separation of fibrine in the heart, and consequent suppression of the current of blood through the body. The same observations have been made by Dr. Jones in relation to the remittent fevers of tropical climates.

Opposed to these conditions there is, I think, another class of epidemic diseases in which the fibrinous constituent of the blood undergoes extreme solution, owing to excessive alkalinity or to the production of one of those peculiar ammoniacal substances known as compound ammonias, which at the present time are receiving so much interesting and important observation in the chemical world. In these cases, if my suspicions are well grounded, the cause of death is traceable ultimately to dissolution of the fibrous or albuminous envelope of the red corpuscles, and to discharge of the free hæmatine into the blood-current. The forms of disease which appear to be classifiable under this head are —the true petechial typhus fever, yellow fever, and plague.

An investigation of the disorders named, with a view to the solution of the problems suggested, would be another fair and most useful prospective labour for the learned members of our body.

In the third place, light appears to be breaking in upon

us in respect to the treatment that should be adopted in cases where the epidemic disorders have seized on suffering humanity. We ought neither to hesitate, nor pause, nor tire, until we have determined some means, definite in their design, by which some reduction of their 25 per cent. of mortality shall be secured. At the present moment our practice, although successful in regard to symptoms of a superficial kind, is vague, contradictory, and unsatisfactory. It will remain thus until an effort is made to reform it. Worse it could not well be; better it must be. To inaugurate the reformation, to ascertain the way we should go, we must first determine the essential differences of various epidemic disorders. If it be true, as has been suggested, that one class of these affections is accompanied with excessive formation and with separation of fibrine, it will follow that those remedies should be as nearly as possible specific which check this formation, tend to hold fibrine in solution, and prevent decomposition. Such remedies are certainly in our hands, and in a rude way their value has been determined; what is wanted is a more rigorous analysis of their worth. At this moment, the remedies to which reference is made are two in number: ammonia and the sulphites. Ammonia, first introduced into practice in the treatment of scarlet fever by Dr. Peart, has since been used by Dr. Witt, by myself, and by other physicians, with a success in this particular disease which may be considered almost as specific; it has also been used with equal success by Mr. Swan of Barrowden, in the treatment of the allied disease diphtheria.

The sulphites of soda and potassa, introduced first to notice by my honoured friend Dr. Polli of Milan, appear to act equally well, and even to prevent death after the injection into the veins of animals of pus, decomposing albumen, and decomposing blood. The action of both these remedies is the same; both produce their effects, not by removing oxygen nor by combination, but simply by arresting the modified fermentative process that has been excited. But in using these remedies we must be cautious that we overstep no bounds; and that with each disease we determine whether it be advisable to increase or to reduce the fermentative change. In that class of disease where there is great solubility of blood, it appears to be a more reasonable practice to facilitate the organic changes, by remedies which hasten metamorphosis, and neutralise the alkaline products. Hence the acknowledged although partial value of mineral acids in typhus; hence, probably, the reason

why typhus disappears, as a disorder, beyond a certain degree of temperature. And, again, as every fermentative change, as every organic change, turns in fact for its development on the motion imparted to the ultimate molecules through heat, we have a great lesson yet to learn in miniature, from those grand series of geographical facts to which I have briefly referred on a previous page. What is true of the world at large as a great chamber, is surely true in smaller chambers; and it is not unlikely that experience will yet show that, by artificial variations of cold and of heat, all the epidemic diseases may be effectually commanded.

In conclusion, in the matter of treatment, we have had recently opened for our inquiry certain important lights relative to the removal and the destruction of those organic poisons which float from the bodies of the sick. I do not refer to ventilation, nor to cleanliness; those are implied, and are locked up in the conscience of every well informed medical man; but I refer to the employment of various vapours which, diffused through the air of the sick room, destroy the organic particles, and render the air pure and inoffensive. Through an observation of Mr. Hoffman of Margate, which I have endeavoured to elaborate, we have now placed in our hands, a means so simple, so practical, so effective, that I have ventured to break through the dignity of an introductory address to bring it here in the way in which it is applied. The substance employed is simple iodine. It is used both in a permanent, and in a special manner. For permanent use, the iodine is merely placed in a common chip-box, or in a glass, covered with a layer of muslin. For special purposes, the iodine, placed in a saucer, is volatilised by the heat of the candle into the air of the sick room, until the odour of iodine is just perceptible at all points. By this means, in one of the severest cases of confluent small-pox I ever saw, and which I attended last summer in consultation with Mr. Hubbard of Kensington Gardens, we were enabled to deodorise the air of the patient's apartment with a facility and a comfort I have never before experienced. The process contributed, I think I may say, largely to the recovery of that case.

Iodine, thus used, also affords a good practical index as to the purity of the air in an apartment. If, on volatilisation, the odour of the metalloid be long in being developed, the evidence is clear that the air is proportionately charged with organic matters.

But our prospect must come to a close; not because there

is an end of it, but because the time presses, and in that which has been presented, there is ample work offered for all our thoughts and all our hands. The work, moreover, is hard, and for a time inglorious; but in its aim and end, it is one of the greatest of all pursuits in medical science and art. It is the kind and form of work moreover, which can alone give to our profession a vitality amongst vitality, and a voice amongst the voices of mankind. So long as we only loiter and hide ourselves in the sick chamber, we are entombed with the living dead, and we appeal merely to the judgments of those who are too feeble to test whether our art, as represented by us, is pretence or reality. It is not our duty, it is not the duty of any one of us, to leave the sick chamber; for he who knows not intimately what is going on within, knows little more of what is influencing from without; but it is the duty of all of us in this advancing day to know the outer as well as the inner chamber; and to make ourselves appreciated as men who understand disease in its social and moral, not less than in its scientific bearings.

Through no section of the body medical does the opportunity offer itself for proving the breadth of our learning, so perfectly as through this Society; and in the sketch I have ventured to draw, as preliminary to the labours of another session, I have tried to indicate the readiest and most sure way by which our efforts may be crowned with success; by which we may appear to the world as statesmen not less than citizens, and as kings as well as priests.

NOTICES OF THE EPIDEMICS OF 1719-20 AND 1759 IN PERU; ALSO OF THE MEXICAN HÆMORRHAGIC DISEASE OF 1736 AND 1855.

By ARCHIBALD SMITH, M.D.

(*Read Nov. 2nd*, 1863.)

In the *Lima Medical Gazette* of 15th March, 1862, we find a narrative from the manuscript of an old Cuzco chronicler, regarding the epidemic that reigned in that city and department in the year 1720. It begins by stating that in the month of April, 1720, Cuzco was visited by a pestilence which, early in the preceding year, commenced in Buenos Ayres, and from thence extended northward as far as Guamanga, or Huancavilica, in Central Peru.

From the perusal of this document, we learn that it was considered to be of the nature of typhus—a malignant tabardillo—so violent and deadly that it hardly admitted of any remedy.

The symptoms enumerated are intense fever, with vehement headache, and pain of abdomen; some were seized with phrenzy, others with blood by the mouth, and black blood from the nostrils, or with vomiting of blood, which was always a bad sign. But the symptoms appear to have varied very much in different cases or circumstances; for the historian remarks, that they were so different, and even contradictory, that no correct diagnosis, or curative plan, could be fixed. The disease proved very fatal to pregnant women; and after the fever ceased, some of those who had been afflicted by it succumbed to other complications—as dysentery. In the midst of so much necessity and obscurity many expedients were resorted to, and new remedies tried; but many cases of cure appeared to be altogether accidental. For example, individuals impatient of the burning heat and restlessness of the fever, threw themselves into the cold-bath and recovered; while others, with equal advantage, drank freely of cold water; and there were not wanting instances of those whose bodies were deposited in the cemetery for dead, but again restored to life.

That this pestilence was *contagious*, was particularly evinced by its ravages among the "*barbers*," and other attendants on the sick, as well as those who assisted at the

interments; and it was observed that the greater number of the llamas and donkeys employed in carrying the dead bodies to their graves were affected with the emission of blood from the mouth.

Under such afflicting circumstances public processions, prayers, and rogatories were resorted to, in order to avert the pestilence from a people whom the chronicler describes as so hardened in their vices, that they felt unmoved by the common calamity. He emphatically relates that "*The white race* in particular continued their strife, theft, fraud, scandals, injustice, and other iniquitous practices with greater eagerness than ever, and passed their time in diversions and gambling."

During the height of the epidemic, the deaths in the city of Cuzco were no fewer than 100 per day. The days of greatest mortality were the 6th, 10th, 15th of August, and the 2nd of September—the maximum of deaths being 700 on the 10th of August. This climax in the rate of mortality was preceded on the night of the 26th of July by the unusual appearance to the northward of an extensive igneous phenomenon, or aurora borealis, which very much frightened the inhabitants.

According to the most judicious estimates, 2000 persons died of this epidemic in the city of Cuzco; and in other provinces, towns, and villages of the episcopate, the deaths were 4000—"*entre Españoles, Indios, y parbulos*, including Spaniards, Indians, and young children." In all 6000, little more or less, though some were of opinion that the gross amount of deaths exceeded 8000. In the midst of so much confusion no exact register was kept; but in this, as in all other epidemics, such as measles, small-pox, etc., the indigent native was the greatest sufferer.

In the month of November, 1720, the epidemic began to abate in Cuzco, where it had reigned since the end of March or beginning of April; and it soon ceased altogether, as the rainy season was fully established in the following month of December. For two years after there was a scarcity of provisions, though not from deficient seasonal rains, nor sterility of soil, but in consequence of the want of hands to gather in the harvest during the first year, and the scarcity of labourers in the succeeding, on account of the depopulation caused by the pestilence.*

* In the Lima Almanac, 1795, this epidemic of 1719-1720 is briefly noticed by Dr. Cosmo Bueno, who further records that a strong earthquake was experienced in Huamanga on the 17th June, 1719.

We find the same pest alluded to in cursory terms by Dr. Unanue under the denomination "*catarro-maligno*," as the consequence of an eclipse of the sun, which, on the 15th of August, 1719 (just at the period of new moon), at the hour of eleven and forty-nine minutes, A.M., extended from 17 degrees 29 min. south latitude, to 40 degrees 13 min.; and for a long time the day was converted into night over those wide regions, as far as the River Plate and the ocean. Dr. Unanue remarks, that in all those southern provinces, the eclipse was followed by the most fearful pestilence ever, up to that period, known in Peru. But the Cuzco chronicler, who also notices this remarkable eclipse, suggests that as the epidemic had commenced on the side of Buenos Ayres, before this phenomenon had occurred, it could not be considered as the primary cause of the infection.

The symptoms of the disease given by Unanue are the following:—"Prostration of strength; excessive pains throughout the body, and especially in the costal region (*en especial al costado*); spitting of blood; difficult respiration; and little fever (*y poca fiebre*).*

Now, if we only look at the hæmorrhagic aspect of this epidemic, as described at Cuzco, we are struck by its resemblance in this respect to the "Matlazahuatl epidemic" of the Mexican table lands, as related by Humboldt, *Essai Politique*, liv. 5, ch. xii, but when the comparison is made with more precision, wide differences will be observed. While Dr. Unanue of Lima describes the Peruvian epidemic of 1720 as *grippe*, or a severe catarrhal disorder, the Cuzco chronicler represents the same epidemic, as witnessed in his department, more under the character of the ardent "causon" of Greek writers. And the common tradition of Huamanga and other Sierra districts of Peru, still preserves the memory of the dreadful cephalalgia that characterised this pestilence under the significant name "fierro-chuto," or iron-cap.

This iron-capped, contagious fever exhibited as one of its most prominent symptoms nasal hæmorrhage. In this particular it much resembled the non-contagious Mexican disorder called the Matlazahuatl. But it disappeared as the rainy season was established, whereas the Matlazahuatl only reigned during the rainy months. We are told that this latter malady is almost exclusively confined to the indigenous Indian race, and to the colder regions at the elevation of

* "Observaciones sobre el Clima de Lima", p. 124, where the author indicates as authority, the treatise of Botoni, "On the Circulation of the Blood," printed in Lima, 1723.

from twelve to thirteen hundred fathoms above the sea. But neither of these conditions belonged to the Peruvian pestilence of 1719-20. We have shown that it attacked the white race, or Spaniard; and far from being the offspring of the cold Cordillera, it originated in the warm maritime precincts of the Rio de la Plata, where, so recently as 1858, yellow fever had intruded itself from the Brazils.

In the progress of this epidemic of 1719-20 northward from Buenos Ayres to Central Peru, it diverged eastward from Cuzco into the warm and humid woodlands on the Atlantic side of the Andes, where it is reported to have produced its greatest mortality among the savage tribe of Chuncho Indians.*

Of the Peruvian epidemic of the year 1759, we have special intimation in the *Noticias Americanas*, p. 202-3, by Don Antonio de Ulloa. This malady, like that of 1719-20, took its rise in the southern or south-east provinces. Its precise place and manner of origin was not easily traced in regions so extensive and remote; but when it was first heard of by those who lived near the Equator, it had already arrived at Chuquisaca and Potosi, whence it extended to La Paz, Oruro, Chucuito, Cuzco, Guamanga, Guancavilaca, Iauja, and Lima; and it continued its course through other provinces along coast and mountains—"alto y bajo"—until it reached Quito. Its progress was extremely rapid, for in the short space of five or six days not one individual, young or old, remained free from its attack, though some were affected less severely than others.† The streets were abandoned and desert; the market places had neither buyers nor sellers; the houses were solitary, with all their inmates prostrate. Ulloa remarks, that "The providence of God only permitted the disease to continue in force in well-constituted individuals for two or three days; and though by the end of this time they remained excessively weak, they could in some degree help others in a worse condition than themselves."

The symptoms of this pestilence, as given by Ulloa, consist of "great dizziness and heaviness of the head; a feebleness in all the senses; strong pains all over the body; fever moderate—"calentura no muy violenta," literally, not very violent; general lassitude; blood from the mouth and nos-

* Unanue, "Sobre el Clima de Lima", § vii, p. 25.

† En el termino de 5, o' 6 dias no quedaba persona grande, ni pequeña, que no adolesciese de ella, manifestandose en unas con mas rigor que en otras. (Ulloa.)

trils; deafness; great prostration; and complete loss of appetite." Such as were subject to habitual ailments, particularly of the chest, found these complaints aggravated when attacked by the epidemic, and in protracted cases they succumbed. Those who were free from previous disease recovered under the use of diaphoretics and a warm, sweating regimen. After the force of the attack had passed away, its effects were long felt during a tedious convalescence, for the body continued weakly, the sight perturbed, the aspect sad, and the mind depressed. It required more than a month to dissipate these dregs of the disease.

As this pestilence was rapid in its invasion and progress, so also it was of short duration, for it fortunately terminated after a reign of about one month.

In those more remote southern provinces, where it first was observed, the mortality was greater from ignorance of the right manner of treatment. It was noticed that the use of the lancet was not only pernicious, but fatal; and the more approved mode of cure ultimately adopted was the simple sudorific regimen already mentioned. Don Antonio de Ulloa suggests that a comet which appeared in those regions of South America, on the 25th April, 1759, might have had some meteorological influence as a precursory cause of this epidemic, which, to all appearance, was of atmospheric origin; for during the month of July, and even from the month of April, the south winds prevailed, and the stream of infection, like the current of the wind, ran from south to north. Were we to imagine that the malady was conveyed by contagion from one person to another, then we should allow that its propagation could not be so extensive and rapid as it proved. Dogs partook of the disorder, and they might be seen stretched in the streets without ability to stand on their feet; yet it was observed of them, as of well-constituted men, that though many suffered, few died of this epidemic.*

In Lima, where chronic disease and weakly constitutions are very prevalent, Dr. Unanue tells us that the pestilence of 1759, described by Ulloa, was the same in kind, though less in degree, with that of the inland regions in 1720.

* In the Cuzco pestilence of 1720, we are told that the dogs in packs fed on the dead bodies of the epidemised, on which they appeared to thrive, until they were shot or otherwise destroyed. The corpses were thus scattered abroad at the mercy of hungry hounds, for want of able-bodied men to collect and bury them in sufficient time. Funeral rites were also omitted, for want of opportunity and the necessary number of priests to meet the urgency of the occasion.

And, again, in 1749, during the first days of autumn, this epidemic, or rather another of the same nature, appeared in Lima, and committed great ravages there, as recorded by the municipal authorities and medical corporation of that capital.*

Humboldt, judging from what he calls the "incomplete description of Ulloa," characterises the epidemic of 1759 as a "typhus peculiar to the elevated regions of the Cordillera."† This malady was no doubt of an adynamic nature, but so ephemeral as hardly to merit the name of typhus. It cannot be said to have been peculiar to the Cordillera range; for while, as Ulloa says, it commenced in some indeterminate climate of the southern provinces, towards Buenos Ayres or Brazil, in Peru it spared no race or age, and spread from Lima northward, by "alto y baxo," by highlands and coast lands to the equatorial latitudes of Quito and other parts.

Hæmorrhagic Disease.—During the year of 1736 a disease called by the natives Matlazahuatl, and consisting of hæmorrhage, or bloody flux from the nose, destroying the power of life in a few hours, prevailed at Mexico. It raged during the rainy season, namely, the months of May, June, July, and September, attacking the higher portions of the town, and destroying the greater number of the inhabitants. This was the only disease prevalent at the time.

In 1855, the disease reappeared in the months abovementioned; thermometer averaging 10 to 24 degrees centigrade; atmosphere moist; height of city of Mexico 7400 feet above the sea. It attacked chiefly women of sanguine temperament, and between the ages of 35 and 50.

Mr. J. Tobin, assistant-surgeon 36th Regiment, described the symptoms and treatment of the disease as follows:—

"*Symptoms*:—Patient seized suddenly with sense of fulness about the head, cold extremities, skin cool, pulse regular, great pulsation of carotids, hæmorrhage now supervened from the nose, and destroyed life in a few hours, from sixteen to twenty-four hours. The blood is florid, but does not flow continually; but at intervals the pulse gradually becomes weaker, and the patient remaining conscious till the last moments, generally dies after syncopy. Hiccough often precedes death. This disease is not contagious, and does not generally attack Europeans, nor is it liable to seize new comers. Convalescence is slow. In fatal cases, soon

* Dr. Unanue, "Sobre el Clima de Lima", p. 124.
† Essai Politique, livre v, ch. xii, tome iv, p. 483.

after death, the skin often assumes a purple colour, chiefly over the upper portions of the face.

"*Treatment*:—Sinapisms to calves of legs, and foot-bath, with mustard or salt and ashes. The anterior nares plugged with some sponge; and the application of iced metal plates over the forehead."*

In reference to the epidemic of 1719-20, its chief point of resemblance to the Mexican "Matlazahuatl" consists in the emission of blood from the nostrils, which cannot be considered as pathognomonic, as it is equally a frequent concomitant in the malignant malarial fevers of the coast and deep warm inland valleys of Peru. But were I to look for stronger symptoms of agreement between the epidemic of 1759, as described by Don Antonio de Ulloa, and some more recent Peruvian pestilence, I would direct the attention of the Epidemiological Society to that precursory disorder which, in 1852-3, was introductory to the outbreak of declared yellow fever in January, 1854.

The epidemic of 1852 was ushered in by the usual signs of a severe cold—such as suffused eyes and a sensation of tension over the forehead, pains in the limbs and loins, and in the more severe cases, general muscular uneasiness, which lasted for several days without remission, until the circulation and secretions became free, and the fever abated; or terminated altogether by perspiration.

In not a few patients of those days might be observed insomnolency and a vague wandering of thought, headache, and general restlessness of body; and after the invasion had passed, and the fever was established, the pulse was in some cases as low as eighty, and rarely exceeded ninety, in native and acclimatised individuals.

The febrile stage of this mild, though widely-spread, epidemy usually disappeared with a critical flow of blood from one or both nostrils; or with the presence of a peculiar red, or rosealous, eruption on the skin, and a free, but peculiarly fetid, perspiration, leaving behind great weakness, lassitude, and inappetency, from which (as in the epidemic of 1759) it often took several weeks to convalesce.*

Again, in the epidemy of 1853, as witnessed by myself in Lima in the earlier months of that year, the red eruption was much less prevalent than in the earlier *stadium* of 1852.

* I am indebted for this information to a manuscript in the possession of the late Dr. J. O. M'William, and which was read to me by himself shortly before his death in April, 1862.

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ON EPIDEMIC PLEUROPNEUMONIA, IN THE MEDITERRANEAN FLEET.

COMMUNICATED BY DR. BRYSON, F.R.S.,
DIRECTOR-GENERAL NAVY MEDICAL DEPARTMENT.

(*Read 7th December*, 1863.)

IN 1860, the Mediterranean fleet consisted of thirty-five vessels, having a mean force of 14,210 men. The total number of cases of disease and injury during the year amounted to 20,915, in the ratio therefore of 1·5 per man. The deaths were 145, or at the rate of 10·2 per 1000 of mean force; and the number of men invalided was 988, or at the rate of 69·5. The average number on the sick list daily was about 823—equal to the crew of an ordinary line of battle ship—or in the ratio of nearly fifty-eight per 1000 men, which is somewhat higher than in the fleet in the preceding year. The prevalence and fatality of fevers were much the same as in 1859. It was in respect of pulmonary diseases that the marked increase in the sickness of the fleet was especially notable, and it is to this point that the attention of the Society is now invited. Two or three of the larger ships were the chief subjects of the epidemic prevalence of these diseases, and the "St. Jean d'Acre" more than any of the rest. She is a screw steamer, mounting 101 guns, and with an average complement of 815 men. She was commissioned in 1859, and arrived in the Mediterranean about midsummer. Soon afterwards, her crew began to suffer from febrile and pulmonary complaints. From July to the end of the year, no fewer than 153 cases of fever occurred; the fever was of a continued type, but tending to become remittent, and many cases assumed a typhoid character, though only one terminated fatally. During the first three months of 1860, she visited the Ionian Islands, but was chiefly at Corfu, and then returned to Malta, where she remained till the middle of June. Notwithstanding the fine weather at that time of the year, and the ample supply of fresh meat and vegetables on board, the health of the crew in April had generally begun to decline. Dr. Edmonds, the surgeon, considered that the crowding of the men at night on the lower badly-ventilated deck had much to do with it. "All

the ship's company," he remarks, "amounting to about 930 men, with the exception of the cooks and about forty boys, slept on this deck. The hammock hooks were placed ordinarily at only fourteen inches apart,—less than the average breadth of the men's shoulders; consequently, while in harbour, when no watch was required at night, and all hands turned in, they formed a compact mass close beneath the beams, the only air available for respiration being above them, that beneath the hammocks being almost entirely shut out from the space above. All the ports, as well as the small round scuttles, were kept closed at night; the small square central scuttles were, however, ordered to be kept open, though, on account of the cold wind which came through them, they were frequently closed by the men who slept next to them. The hatches were covered with gratings, but sometimes the open spaces in the gratings were accidentally obstructed by lumber. The only other means of admitting fresh air were three windsails, leading down to the cock-pit, which it was difficult to keep properly trimmed, and in calm weather they, of course, were entirely useless."

The dampness of the lower deck, from too frequently washing it, was also, in his opinion, objectionable.

Nothing can more strikingly show the condition of the atmosphere in which the men slept than the fact that Dr. Edmonds found that the air above the hammocks, or between the hammocks and the deck overhead, was from 8 degrees to 12 degrees hotter than the air below them, or between them and the floor of the deck! Such an atmosphere was nothing short of being a poisonous vapour-bath.

Various means were tried to improve the ventilation of the lower deck, by cutting holes of communication in different directions for the better admission of fresh air, and the more ready efflux of the foul; and, in addition to these alterations, a hundred men, who had hitherto slept on the lower deck, were removed to the deck above, where there was abundance of room. This was early in June, on the 17th of which month she left Malta for Navarino, where she stayed till the 10th of July, and soon afterwards was sent back to Malta, in consequence, apparently, of her continued sickliness. In two months upwards of fifty cases of pulmonic disease (thirty-three of which were thought to be of a phthisical tendency), exclusive of ordinary catarrhal affections, were entered. While at Malta, between the end of July and the beginning of September, the weather was oppressively warm; the heat between decks was from 82

degrees to 88 degrees, though the ports, scuttles, and hatchways were continually open. At this time, on clearing out the fore magazine, a quantity of unctuous black mud, mixed with some shot and ballast, was found over the bilge and kelson. Although the mud was free from smell, several of the men employed in removing it began soon afterwards to complain "of being out of health, of pain in the chest, and shortness of breath, slight at first, but gradually increasing, until they were compelled to seek for medical assistance."

During September short cruises were made off the island; but although the weather was very fine, and all the ports were kept open, and one watch was always on duty, so that the number in the lower deck at night was much less than when in the harbour, the sickness did not cease to prevail; and this, too, notwithstanding that by this time all the bad cases had been sent to the hospital on shore, and many more had been discharged as unfit for further service on the station. By the beginning of October no fewer than eighty-six, or a tenth of the whole crew, had been invalided, most of whom presented signs of congestion, if not of consolidation, of the lobes of the lungs.

Prior to this date, many of the sick had begun to shew symptoms also of a scorbutic nature, although the crew had all along been well supplied with fresh meat, vegetables, and fruit, and lime juice and sugar were issued daily. All the patients had a weak cachectic appearance.

As most of the other ships of the fleet, although similarly exposed, and performing the same description of duties, were exempt from this disease of the "St. Jean d'Acre," it was naturally supposed that there must be some cause of mischief within her to account for her extreme sickliness. The crew were therefore now removed into the "Hibernia," in order that she might be thoroughly cleared out.

When the stores, tanks, and provisions had been removed from the holds, the channels draining into the bilge were found to be obstructed by mud and *débris*, and higher up, where the channels were covered, they were partly filled for some distance up with decaying chips and sawdust. In the ship's bottom there were several small leaks, which, in the course of twenty-four hours, admitted several gallons of very offensive fluid of a black colour, the noxious effects of inhaling the vapour of which were perceptible on several persons. This, together with the effluvia arising from the decaying woody *débris*, in connexion with a diseased state of the blood consequent on the continued inhalation of impure

air from the crowded state of the lower deck, the surgeon considered a probable cause of the disease.

For a few days after the crew had been transferred to the "Hibernia," the pulmonic attacks became less numerous, and they were also more amenable to treatment.

In November, the crew returned to their own ship, and she at once left Malta for Gibraltar, where, after an extremely long and stormy passage, she arrived on the 14th of December. She remained there a week, and then sailed for Lisbon. The tendency to pulmonic disease had never ceased; for on the day after her arrival in the Tagus, thirty-two cases were sent to the temporary naval hospital on shore, fifteen being left on board from want of room. Latterly, too, scorbutic complaints had become more frequent than before; sixteen cases were added to the sick list during the quarter.

The total number of cases of this singular pulmonic epidemic, together with cases of undoubted consumption and of inflammatory affections of the respiratory organs, from its commencement in April or May up to the end of the year in the "St. Jean d'Acre," amounted to 285, which Dr. Edmonds grouped thus:—Bronchitis, 7; pleuritis, 19; pneumonia, 13; hæmoptysis, 7; phthisis, 102; pleurodynia, 20; and cachexia pulmonis, 117. The last-named are those in which the physical signs of phthisis were not fully developed; they were characterised principally by debility, loss of flesh and strength, general cachexy, and congestion in the upper lobes of the lungs. The number of cases set down as phthisis is unprecedented; but, as many of the patients recovered soon after they returned to England, and rejoined the service, it is to be hoped that the recoveries were equally numerous amongst those who were finally discharged from it.

In January 1861, while at Lisbon, the health of the crew began to improve, and the number of pulmonary attacks to diminish. In the beginning of February there were, exclusive of forty-three in hospital on shore, only twenty-five sick out of a complement of 873; which favourable state the surgeon attributed to the fineness of the weather, and the very great attention paid to ventilation. While she lay at Lisbon 150 men had been added to the crew; as this would increase the crowding in the lower decks at night time, the surgeon expressed his apprehension that "the high temperature we shall soon be exposed to, on our return to the station will further develope disease."

The ship left Lisbon on the 3rd of April, reached Gib-

raltar on the 10th, proceeded to Malta, where she remained three weeks, and again returned to Gibraltar. During the three months, from April 1 to June 30, there were put on the sick list forty-six fresh cases of one form or other of respiratory disease. Besides the continued prevalence of those disorders, the number of cases of fever was again in excess of that of any other ship in the fleet.

The weather was unexceptionable, and the ship "as well ventilated as the present means will admit of."

In July the crew continued sickly, fresh pulmonary cases being added to the sick list. The ship continued at Gibraltar and Tangier, occasionally going out to sea for a cruise, until the end of August, when, in consequence of her continued sickly state, she was at length ordered back to England to be paid off. As the surgeon had predicted, the sickness had increased steadily with the heat of the weather; in the first week of August, when the heat was greatest, as many as a hundred were on the sick list, exclusive of the men in hospital on shore.

A few days after leaving Gibraltar, on the way home, the weather became much cooler. The sickness rapidly abated, and, on the arrival of the ship in England at Plymouth, most of the men who had been embarked from the hospital had become fit for duty. Of course, the anticipation of liberty and the prospect of long leave led the men to put the best face on their cases. These circumstances aided the change of climate in restoring them to health.

And now for a few remarks about the symptomatology and ætiology of the singular epidemic that has been described.

The symptoms are thus enumerated by Dr. Edmonds:—

"Comparatively few of the patients complained of sudden accessions of illness. Pain in the chest was the most general symptom; there were also shortness of breath on exertion, a quick, weak, excitable pulse, and they looked cachectic. Cough was not generally an early symptom, though it occurred afterwards. Expectoration comparatively was rare; in some it was muco-purulent; in one individual it was copious and melanotic in appearance; but this was exceptional, and not permanent: constant headache was present in a large proportion of the cases. Pain was often referred to the epigastrium, and in a few there was much irritability of the stomach. The pain in the chest and difficulty of breathing were generally *worse at night;* and there were night sweats, but without previous pyrexia: palpitation of the heart was a very frequent symptom.

"On examining the chest by auscultation and percussion,

abnormal sounds were generally heard, varying from an unusual coarseness of the respiratory murmur in the upper lobes of the lungs to decided evidence of pulmonary induration, whether from hepatisation, or the deposit of tubercle, I cannot decide; in several cases, however, which had a fatal termination, the latter condition was indisputably present. The symptoms, both general and physical, were all suggestive of phthisis in its early stage. Still a great many of those who were invalided rapidly improved when they arrived in England, and soon afterwards were able to rejoin the service. Scorbutic symptoms were present in a large number of cases, though they likewise occurred separately."

Deputy-Inspector Dr. Armstrong, in charge of the naval hospital at Malta, remarks of the cases sent on shore:—"The majority were in the early stage of the disease; the signs of consolidation at the apices of one or both lungs, but chiefly the right, were present, with general scorbutic cachexy; while in others the disease was fully developed, with all its well-known symptoms.

"The broken-down cachectic and scorbutic-like condition of all the phthisical patients rendered their early removal from the climate of Malta a matter of necessity. The cases of congestion, which were nearly all received from the "St. Jean d'Acre," had a scorbutic appearance, which with propriety might have been designated true scurvy; but the prominence of the chest affection, from the passively congested state of the lungs, led me to retain the above designation—that being nominally the disease for which they were sent to hospital."

As to the probable *causes* of the disease, it is necessary first to state that, although there was certainly a somewhat greater amount of catarrh in the fleet in 1860 than in ordinary years, nothing like epidemic influenza prevailed on the station, and neither the civil population nor the military at Malta or Gibraltar suffered more than usual from pulmonary complaints. Moreover, the same may be said of most of the ships of the squadron. The disease, it is believed, chiefly attacked the men who had recently joined the service on the bounty system, and were anxious to quit it as soon as possible. Amongst them there was an undue proportion of idle, worthless characters, much addicted to drink; generally speaking, they were physically weak and prone to disease; and, unlike the generality of men-of-war's men, always eager to have their names put on the sick list. That such a state of constitution might predispose to

pulmonary and other forms of illness, is doubtless true; still, the main question is, how came it to pass that in a fine climate and with a wholesome and regular dietary, good clothing, and other favourable circumstances, the health of the crews of the "St. Jean d'Acre" and of one or two other ships, should, instead of improving, as might have been expected, have become so seriously and continuously bad? Dr. Edmonds attributed the mischief to "the malarious emanations from the decay of woody fibre or sawdust left in the channels by the shipbuilders; this being continually in a moist state, would naturally act more injuriously in a high temperature, and in conjunction with the overcrowded state of the sleeping deck, sufficiently accounts for the disease."

The surgeon of the "Cressy," Mr. Keown, remarks that, "however much I have been disposed to blame the ship, nevertheless, after leaving Gibraltar to return to England, the disease ceased, and slight cases rapidly recovered;" and Mr. Pottinger, the surgeon of the "Neptune," one of the ships that suffered most, makes the following statement:—

"To ascertain the cause of so much disease was a point of no small importance; and, as the weather, though somewhat changeable for a Mediterranean summer, could not be fairly adduced, we were naturally led to seek for the cause within the ship. Our attention was forcibly directed to the crowded state of the lower deck by night, and the imperfect ventilation; the air being close and almost offensive when the ports were let down; while, on the other hand, the men complained of draughts when they were 'triced' up. In order to remedy this as much as possible, a greater number of men than is usual in the service was billeted on the main deck, and at sea only one watch's hammocks were taken down at a time, while the ventilation, by windsails, was strictly attended to; but why the disease should prevail in one ship, and not in another, all being equally crowded, is a difficult question to solve."

Whether it was solely in consequence of the improved ventilation or not, that the disease subsequently lost its epidemic character in the "Neptune," it may be difficult to determine; but that by the timely adoption of suitable arrangements for lessening the impurity of the air in the lower deck of large ships-of-war at night, much may be done to keep down disease, and to secure the health of the crew, was strikingly shown in the cases of the admiral's ship, the "Marlborough," and also of the "Agamemnon." In both these ships not only were means early taken to increase the free renewal of the fresh and the ready escape of the vitiated air,

but the crowding of the men in their hammocks was much diminished by removing a large number of them from the orlop and lower deck to the upper decks, which are of course always better ventilated. The testimony of the medical officers, Dr. Mackay and of Dr. Graham, on this most important subject affecting the welfare of the service at all times and on all stations, is conclusive, and it is of the utmost value.*

The only other point connected with the history of the above pulmonary epidemic that requires notice is to mention that, after the admission of the worst cases from the "St. Jean d'Acre," etc. into the Malta hospital, a number of the other inmates, ill of other ailments, became affected with similar symptoms—a fact which might lead to the suspicion that the disease was, to a certain extent, communicable even in the well-ventilated wards of that establishment, and to men who had not been exposed to the exciting cause or poison in any of the infected ships.

The following two tables will show the marked difference in respect not only of pulmonary attacks, but also of other diseases, (the prevalence of which, it is well known, is intimately dependent upon the condition of the respired atmosphere in all localities,) in different ships of the Mediterranean squadron in 1860; they need no comment. They have all the force of a demonstrative experiment that the condition and arrangements in respect of health of many of our ships-of-war are anything but satisfactory on their being put into and while they are in commission.

TABLE I.

1860.	No. of Crew.	Total cases of Disease and Injury.	Daily average on Sick List.	Sent to Hospital.	Died from Disease alone.	Invalided from Disease alone.
Marlborough ...	1145	937	39	20	4	35
Agamemnon ...	840	881	38	29	2	27
St. Jean d'Acre...	815	1601	49	207	8	146
Cressy	720	1483	53	92	8	87

TABLE II.—*Number of Cases during the Year.*

1860.	Fevers, contind. and remittent.	Diseases of the Lungs, etc.	Diseases of the Bowels.	Ulcers.
Marlborough	10[1]	129	64[6]	75.
Agamemnon	17	241[3]	58	30
St. Jean d'Acre ...	136	401[4]	171	115
Cressy.....	12[2]	298[5]	254[7]	102

[1] One case fatal. [2] Two cases fatal. [3] One case fatal. [4] Six cases fatal. [5] Three cases fatal. [6] One case fatal. [7] Two cases fatal.

* Statistical Report of the Health of the Navy for 1860, pp. 42-4.

NOTES ON THE EPIDEMIC AND OTHER DISEASES OF THE NATIVES OF INDIA.

By GAVIN MILROY, M.D.

[*Read March* 7, 1864.]

Among the many and multifarious interrogatories sent out by the Royal Commissioners on the sanitary state of the Indian army, one was with the view of ascertaining the general health condition of the native population adjoining to the different military stations, and the nature of the most prevalent diseases, "especially epidemics or spleen disease," among them. The following brief memoranda are taken from the replies of the medical officers, and are interesting as the *primitiæ* of what may hereafter be done by the service in working out the important subject of the medico-topographical history of India, unquestionably one of the most fruitful fields of scientific research in any part of the world.

The general character of these replies will be best seen by giving a specimen or two as they stand. Thus, from Calcutta we learn that "the most prevalent diseases are fevers, cholera, dysentery, and small-pox. The usual sequelæ of fevers and dysentery, viz., enlarged spleen and fatal diarrhœa, are remarkably prevalent." The prevalence of these diseases is attributed to "mud, exuberant growth of jungle, filth, stagnant water, bad drainage, unwholesome drinking water, and nuisances of various kinds." Nearly the same may be said respecting the cities of Madras and Bombay.

In and around Peshawur "intermittent fevers, bowel complaints and rheumatism are the most prevalent diseases among the natives. Small-pox generally prevails as an epidemic towards the end of the cold season. In some districts a severe form of remittent, assuming a typhoid type and attended by jaundice, occurs at times as a severe and fatal epidemic. Spleen disease is not very common." The rural population are considered to be healthy; "it is different with the large densely-crowded city of Peshawur, with its narrow dirty streets and ill-ventilated houses."

If we pass now from the north-west of India to its southern

extremity, and take Colombo, the seat of government in Ceylon, we read that the most frequent diseases among the natives are "rheumatism, fever, and bowel complaints. Spleen disease is not frequent. Cholera and small-pox do not visit the station as frequently as in former years. Measles and chicken-pox prevail nearly every year. A mild form of scarlatina is occasionally seen. Leprosy and elephantiasis are common. Beriberi is very rare." . . . "The causes of so much fever, bowel complaint, and rheumatism are the hot and moist state of atmosphere, and the presence of malaria in it. Natives are also, from their general debility and poorness of living, more susceptible than Europeans to fevers."

In almost every reply throughout the length and breadth of the land, the prevalence of fever, chiefly remittent and intermittent, is mentioned. In some districts and regions, enlargement of the spleen and the associated anæmic or pale-blood cachexy are common; in others not. Whereon the prevalence, or otherwise, of this sequela of the endemic fever depends, has not, I presume, been satisfactorily made out; it is a problem well worth investigation. Hepatic disease appears to be not frequent among the natives;* only occasionally we meet with such entries as "diseases of the liver, spleen, and lungs" as common among them.

I would here notice in passing the following brief account of what is denominated (*Times*, May 1863) a "remittent congestive fever" that has recently prevailed most destructively in Lower Bengal. "In the country of Jessore, on the confines of which the Ganges loses itself in the Sunderbund marshes, a pestilence like the plague of Egypt, generally preceded by cholera, has long been endemic, and during the last three years—since June 1860—has spread all round Calcutta and along the line of the East India railway to Burdwan. It has slain more than 40,000 victims, or at least sixty per cent. of the population attacked. By dispensaries and native doctors the Government in vain attempted to arrest the pestilence; but last November, with the latest fall of rain, it spent its fury. For miles whole villages were abandoned, and there were none left to bury or burn the dead. The report of Dr. Elliott, appointed to investigate

* Sir R. Martin has remarked that "the native Hindoos do not suffer from hepatic diseases in any degree as compared to the Europeans. This must be (1) partly because the native population is acclimatised, and proof against the malarious influences so pernicious to the European; and (2) partly because of the extreme comparative temperance of the native population in all that relates to animal food and stimulating drinks."

the epidemic, reveals horrors which even technical language does not modify. The fever carried off its victims in from five hours to fifteen days."

As it is only of recent years that attention has been drawn to the existence of true typhoid or enteric fever in India, information on this subject in respect of the native population is as yet very scanty and imperfect. There seems good reason to believe that it is far from being uncommon, either as a distinct independent disease, or, probably more often, as associated and complicated with other forms of endemic pyrexia, in Calcutta and other large cities, having a crowded population and the usual accompaniments. At Delhi, we read of the fever cases among the natives and others being frequently attended with adynamic and cerebral symptoms, diarrhœa, and hæmorrhage; and it has been already stated that in Peshawur the endemic remittent at times assumes a typhoid character. Inspector-general Dr. Macpherson, speaking of the Madras Presidency, remarks that fevers of this type appear to be on the increase in some of the large military stations; and deputy-inspector Dr. Coles mentions that at Secunderabad—so long notorious for its insalubrity, artificial more than natural—"an obscurely remittent fever with an adynamic character, often running into confirmed typhoid, prevails during and immediately after the rains. This was particularly observable at the time when asthenic dysentery prevailed last (1858), shewing an apparent connection in their ætiology." He adds—"to a faulty mode of laying out the Sepoy lines, a great deal of the fever among the native troops seems mainly attributable."

Next to fevers in frequency and fatality are alvine fluxes, including diarrhœa and dysentery, together with cholera. Respecting the last-named disease, there are numerous memoranda, scattered through the replies, respecting the dates of outbreaks in different stations throughout the peninsula, which, if chronologically and topographically arranged, might serve to indicate the migratory course of this pestilence. In some years it is much more widely diffused than in others; and in respect, too, of its virulence and malignancy, a like diversity will be found. 1859 appears to have been a year when it prevailed in a vast variety of places, in the different presidencies. Whether that was a sickly year in other respects, and also whether cholera was at the same time prevalent in other countries of the East, we have no means of ascertaining; and yet these are points of great interest to the epidemiological student. It is much to be desired that we

could have annual topographical charts of the outbursts of the disease, just as we have in the present day charts of storms and of other cosmical phenomena. The well-appointed staff of medical observers scattered over India, from the Himalayas to Cape Comorin, might easily effect this object, under the direction of the departmental chiefs of the Presidencies. Among many other points of interest that would be elucidated, is the ascertaining of what intervals occurred between successive outbreaks in a station. At Aden, "a very severe outbreak took place in Oct. 1858; the disease had not been known in the station for ten years previous. At the time of the outbreak, and for some months afterwards, it raged among the population on both sides of the Red Sea. It lasted among the troops only for a week." At Kurrachee it prevailed epidemically in 1853, 1854, and 1860; at Agra in 1843, 1856, and 1857; at Kirkee in 1853, 1855, and 1860. At Belgaum it was prevalent in 1860; it had been absent for nearly ten years.

I shall close these cursory memoranda by adding a few jottings respecting the disease in the East during last year (1863).

India and several parts of China have continued to be much infested with epidemic cholera. The troops in Peshawur were some time in getting rid of it. The city of Benares and various places in the north-west provinces were infected in the spring; and in a later part of the year, after heavy inundations from the excessive fall of rain, the disease broke out in numerous districts. The town and island of Bombay were very sickly, from the prevalence of fever and cholera about the end of 1862 and beginning of 1863. About the same time, the cholera continued to prevail with great severity in the great Chinese port of Shanghae, and the French fleet in the waters of Ningpo had sustained heavy losses from it just before that period. More recently we have heard of the disease still raging at Shanghae, and of Canton and the island of Macao becoming infected. The Philippine Islands, it is believed, suffered about the same time. The latest accounts from India represent Lucknow, and other places in Oude, as suffering most severely from the pestilence.

I would now notice another group of epidemic diseases to which the natives of India are subject, the genuine exanthemata; and, first, of small-pox. In almost every return—certainly in more than nine-tenths of them—this terrible malady is enumerated as one of the most frequent of all

among the native population, close to or around the military stations, throughout the entire peninsula. I shall, therefore, particularise only a few instances out of the numerous aggregate. In Calcutta, it is estimated that twenty-three out of every hundred deaths among the resident Hindoos are from small-pox. "Epidemics of small-pox, caused by the practice of inoculation, are common in February and March." At Agra, "it prevails every cold season." At Darjeeling, "it is the scourge of the hill population." At Roorkee, "it is very common and destructive in the spring when inoculation is practised." At Peshawur, "it generally prevails epidemically towards the close of the cold season in the city and the surrounding districts." At Lahore, "epidemics of small-pox and measles appear almost annually. Small-pox is continually rife in some districts of the Punjaub."

In the Bombay presidency, we find that in the city of Bombay "small-pox and measles are prevalent at times, and cholera at other times." At Kirkee, "small-pox, chicken-pox, and measles, are the most frequent diseases." A similar remark is made in the return from Baroda. At Hyderabad, "there are always sporadic cases of small-pox in the town. It often prevails epidemically." At Ahmednugger, "small-pox is becoming more rare as the benefits of vaccination are becoming more known and more permitted among the natives, who here, as elsewhere in India, have been exceedingly averse to it." At Aden, "small-pox prevails at all seasons."

In the Madras presidency, small-pox is noted to be more or less frequent at St. Thomas' Mount, Secunderabad, Berhampore, Vizagapatam, etc.; also around one or two of the stations in Burmah, at Penang in Prince of Wales' Island, and at Singapore in the Straits of Malacca. It is said to be unknown at Labuan in the island of Borneo.

In Ceylon, the disease has been considerably less prevalent of recent years than formerly, in consequence of more attention having been paid to vaccination. At Colombo, "cholera and small-pox are not so frequent as formerly. Measles and varicella prevail almost every year;" and at Kandy, "small-pox occurs occasionally, but it has been much checked by the introduction of vaccination." Mention is frequently made, in the stational reports from different parts of India, that the native troops have comparatively escaped while the disease was prevailing around the cantonments, as they had been recently vaccinated. Occasionally, some of the native regiments have suffered severely. Thus

the Lucknow field force at Cawnpore is stated to have had, in 1858, no fewer than one hundred and nine cases and twenty-seven deaths. The same year, we read that at Samulcootah, in the Madras presidency, "the men were all vaccinated, after which nineteen cases occurred, but they all did well." The whole evidence goes to show what an enormous amount of small pox exists, every year, throughout India. Its persistence and extension are aggravated by the too common practice of inoculation. Wherever vaccination is perseveringly and systematically carried out, a signal diminution of the scourge has been the result. Several of the medical officers, in their stational reports, say that its adoption, not only among the sepoys themselves, but also in the regimental bazaars, etc., would be an inestimable blessing to the population generally.

The not unfrequent mention of varicella among the prevalent zymotic diseases of the native population of India deserves special notice, as the relations between this disease and small-pox are, more especially as they occur in warm climates, far from being definitely settled, and medical writers seem to be anything but agreed whether they are generically and essentially distinct from each other. At all events, there is obviously no small difficulty in, at times, discriminating between a bad case of varicella and a mild or modified case of variola.* To quote but a single instance. The medical officer at the station of Hurryhur, in the Madras presidency, writes: "Small-pox is not often seen in its genuine form, but is mostly modified, the 'pseudo-pustule' wanting the true central depression, and seldom leaving anything like a 'pit' in its site when desquamation takes place. The premonitory fever is seldom well marked."

The subject indicated above evidently calls for a more careful examination than it has yet received; for it is not in the East only, but also in the West Indies, and other countries abroad, that the relations between variola and varicella are not satisfactorily determined.

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* "Twenty-nine cases of varicella occurred in the boys' school at Bycalla in March and April 1838. Since then, cases of this disease have come under my observation, and I am satisfied that the term 'varicella' has not been applied by me to an affection varioloid in character. The diagnosis of the two diseases has been already explained in the remarks on small-pox. In 1849, a varioloid form of varicella affected twenty-four boys in the school, but only one girl, in March, April, and May. I am unable to say whether this epidemic differed from that of 1838, or whether the term 'varioloid', used by Mr. Carter, merely indicates a difference of opinion on the part of the observer." (Morehead, "On the Diseases of India", 2nd ed., p. 201.)

The only other exanthematous fever besides small-pox and chicken-pox, which appears to be common in India, is measles. With but one exception, no mention is ever made of scarlatina; it seems that this disease, so widely diffused, and so fatal in some regions of the world, is scarcely, if at all, known in India. The only allusion to it in the stational reports is in that from Colombo in Ceylon, where it is stated, "a mild form of scarlatina is occasionally seen."

On this curious subject, the non-occurrence of scarlatina in India, I again quote from the standard work of Dr. Morehead:—"We have not any satisfactory account of the occurrence in India of the scarlatina simplex, anginosa, and maligna, of European countries. A fever, remittent in character, and attended with scarlet eruption, has prevailed epidemically on several occasions from 1824 to 1853 in Bengal and the North-West Provinces." In the earlier epidemics, rheumatic pains of the joints were frequent; but this symptom has not been present, at least to the same extent, in late invasions. The disease was by some regarded as more akin to the "dengue" of America, etc., than to genuine scarlatina.

Hooping-cough is occasionally mentioned among the prevalent diseases of the native children; also croup, and mumps. Bronchitis and other inflammatory affections of the lungs are far from being unfrequent in cold damp weather, especially in the hilly districts.

Rheumatism is one of the most frequent diseases that affect and disable the Sepoys; it is often much more extensively and more severely prevalent among them than among the European troops. A considerable proportion of the most troublesome cases are believed to be of syphilitic origin; but it is often very difficult to obtain accurate information on this point. The medical officer at Vellore, in the Madras presidency, remarks: "Rheumatism is the most prevalent of all diseases among the native troops, and it is not unfrequently simulated. I have long been of opinion that the greater proportion of so-called rheumatic complaints among the native troops are due to a venereal taint. Those who have charge of dispensaries for civil patients and paupers are aware of the great amount of venereal disease which prevails in all Indian stations." This remark is borne out by other evidence. The amount of syphilis, &c., contracted by European troops in the bazaars is enormous.

That peculiar form of acute dropsical disease known by the name of beriberi, and which is characterised by paralytic

weakness, numbness, and stiffness of the lower extremities,* by general œdema with a swollen bloated countenance, oppressed breathing, etc., is most prevalent in some districts on the Malabar and Coromandel coasts of the Madras presidency, and also in Ceylon. It is described by the medical officer at the station of Masulipatam as "being confined to the natives, and often running a rapidly fatal course; the patient generally dies from effusion on the brain, or disease of the heart, which often becomes implicated in the course of the disease." Exposure to a variable, moist, and malarious climate, coupled with defective nutrition, seem to predispose to, and perhaps also to excite, the disease.

Dracunculus, or Guinea Worm, appears to be much more frequent is some districts than in others. It is rarely seen in Europeans, but is occasionally very prevalent among the natives. That it arises from the use of water containing the animal or its ova, cannot be doubted; but whether generally from drinking the water, or from bathing in it, is still an open question. Her Majesty's 8th Hussars and 10th Regiment Native Infantry suffered considerably from the disease last year (1859), and evidently contracted it in the jungles near their station in Central India, writes the medical officer at Kolapore, in the Bombay presidency.

As a rule, the Dracunculus is confined to the leg; but sometimes it is found above the knee, and occasionally in the upper extremity. It has even been extracted from the scrotum.

Goitre is mentioned as very common among the hill people at *Landour*, near *Simla*, and also at *Darjeeling*, two of the hill stations on the Himalayas.† It doubtless exists in many other mountainous districts of India; but I have not observed any notice of it in the returns from the Bombay and

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* Mention is made, in two or three of the returns, of "a peculiar paralytic affection of the loins and lower extremities, produced by eating a description of pulse—*lathyrus sativus*."

† So prevalent is it in some parts of Tirhoot, that it is almost the exception, it is said, to meet a man not having a goitre; and the district contains three millions of inhabitants. Mr. Macnamara, who, at the dispensary under his charge, had treated 23,000 cases in three years, has used with great advantage an ointment of the biniodide of mercury, fifteen grains to an ounce of simple cerate. "Indian Annals of Medical Science", quoted in the "Annals of Military and Naval Surgery" etc.—a work of great merit, and which, if continued with the same ability with which it has started, will prove most useful to the student of topographical and geographical, as well as of practical and hygienic, medicine.

Madras presidencies. Accurate data respecting its topography in India would be a valuable addition to our knowledge.

Diseases of the skin are exceedingly common among the poorer classes of the native population. Itch prevails to a most loathsome extent. There are numerous forms of chronic cutaneous diseases which it would be difficult to designate.

There is, moreover, a large amount of the genuine leprosy, such as prevailed during the middle ages in Europe, and also of the true or proper Elephantiasis, or pachydermatous enlargement of the lower extremity and of the scrotum. The latter disease is generally known in India as the "Cochin leg" (in the West Indies it is known as the "Barbadoes leg") from its great prevalence in that district, on the Malabar or western coast of the southern part of the peninsula. In the stational report from Cochin, it is stated to be one of the most prevalent diseases among the natives there, and generally to prove fatal by dropsy supervening.

These two diseases, Leprosy and the Elephantiasis, quite distinct from each other—although apt to be confounded in consequence of the blundering nomenclature of nosologists, who have designated the former as Greek elephantiasis, and the latter Arabian elephantiasis—appear to be often existing in the same locality, and occasionally to be present together in the same patient. Very little attention has hitherto been paid by medical men, in India, as to the circumstances and conditions which may favour the development and aggravation of these sad and distressing maladies. The field is one which the interests of humanity, as well as of science, loudly call for investigation.*

In concluding these brief and very imperfect notes, I would simply remark that the more we make ourselves acquainted with the prevailing diseases among the native population in India—and the remark is equally applicable to other countries—the more convinced we must feel how much may be done by wise prophylactic and preventive medicine to avert or diminish the sickness and suffering that abound everywhere. The fevers and fluxes which prove so destructive of health and life are largely due to the un-

* The inquiry that is now being carried out by the College of Physicians, at the request of the Colonial Office, promises to be of great interest and value. Nowhere is leprosy more common than in many parts of India; and the official information that may be expected from the different Presidencies, as well as from other countries, cannot fail to excite general attention, and lead to a better knowledge of the disease. February 1865.

drained and jungly, and therefore malarious, state of the land. As systematic cultivation advances, so will these maladies abate in frequency and force. Then, too, the famine fevers, hitherto almost periodic in some parts of India, as they used to be at one time in Europe, will become less and less common. Hitherto the want of sufficient and wholesome food, to which must be added that of proper clothing, among the natives, has powerfully aided the pernicious influence of the damp and filthy condition of their dwellings and their surroundings. That a vast amount of that desolating scourge, the cholera, not to specify other diseases, is due to these local and personal causes, cannot be questioned. The natives sometimes suffer severely from it, while the contiguous military station is exempt. It is a most significant and suggestive fact, that most of the outbreaks of epidemic diseases among our troops seem to have their starting point in the contiguous native villages or bazaars; these being generally first affected, before the sickness appears in the barracks or cantonments. The lesson is obvious. Let a more vigilant and active supervision be maintained over the health-condition of the natives, and the benefits that will accrue will be felt by others as well as by themselves—so true is it in a physical as well as in a moral sense, that "no man can live unto himself, and no man can die unto himself."

As yet, little exact or reliable information has been obtained as to the average death-rate among the native population. It varies doubtless in different provinces, cities, and districts in India as elsewhere; but hitherto all is mere surmise and conjecture. We must hope that, ere long, attention will be directed to this vital question. In Calcutta it has been estimated among the natives of all ages at 50 per 1000; the Hindoos dying at the rate of 57, the Mussulmans at the rate of 35 in the 1000. The mortality fluctuated in eleven years from 37 to 81; and winter, as in England, was the unhealthiest season. The mortality in the suburbs is unknown. In Delhi, containing nearly 120,000 inhabitants, the death-rate was, in 1833, estimated at 36 in 1000. It is, as might be inferred from its situation, less unhealthy than Calcutta. On the whole, Dr. Farr remarks, that "the mortality of Indian cities is not higher apparently than that of the European cities in the same unhealthy conditions."

ADDRESS OF DR. BABINGTON, F.R.S., ON VACATING THE CHAIR.

(*4th April*, 1864.)

GENTLEMEN,—You are all of you, I believe, aware that I am now about to address you from this chair for the last time. A periodical change of the office-bearers in scientific, and indeed in all public, bodies is so usual, that it may be regarded as the rule, nor does this society form any exception in principle (for we all go out of office annually), or in practice, except in the case of your president and your secretaries. With regard to your honorary secretaries, circumstances, alas! of an imperative and melancholy nature have necessitated changes that, from the able manner in which the duties have all along been performed, your courtesy and sense of expediency would never have suggested. I alone, therefore, of all the governing body have hitherto remained at my post from the foundation of the Society in the summer of 1850, to the present time. Often have I thought of retiring. More than once have I expressed a desire to do so, which has been overruled by others, from the too favourable view which has been taken of my services and utility. I have now, however, quite made up my mind that it is for the good of the Society that a change of presidents should take place. A president is, or ought to be—more than any other member or officer of a society—its directing mind, its guiding spirit, its controlling adviser. But individual minds, especially of those somewhat stiffened by age, are too apt to have fixed habits and notions—to run as it were in grooves; and, although they be thus rendered less adventurous and executive, more consistent and safe, yet are prone to pursue the same path, and to be conservative of the same system. A change of government is beneficial as breaking through this routine, and its very novelty imparts new life to its proceedings. To be selected by our colleagues in any public body to preside over their councils is a high honour, not indeed unaccompanied by duties sometimes of an onerous nature, yet always to be esteemed as an object of laudable ambition. It ought there-

fore on this account not to be unattainable by being monopolised for an indefinite period. I hope that it will not be attributed to any feeling but that of a sincere desire for the welfare and prosperity of the Society if I express an opinion, even on the occasion of appointing a successor whom I unfeignedly believe to be superior to myself in many respects, but especially in his knowledge of epidemics, and of the best methods of investigating their history and their nature, that the office should not be held for more than two years, which is the period adopted in the Royal Medical and Chirurgical Society, in the Pathological, the Hunterian, the Medical, and, as I believe, in most of the scientific societies of this country. Experience seems to sanction this limitation, and, to give only one reason where several might be stated, I would advert to the time-honoured custom, that the president should, at the commencement of each session, deliver an address to the members. This is very practicable for once, or even twice; but the President himself, as well as his audience, becomes weary of dwelling on the same topics year after year, and both must of necessity feel desirous that some other mind should be employed rather than his in furnishing this annual address. So strongly have I been impressed with the expediency of effecting this object that I have on two or three occasions acquiesced in the suggestion of our late zealous secretary Dr. M'William, that instead of an address from me, he should draw up an account of the epidemics in various countries that had occurred during the year. Dr. Milroy has on one occasion since Dr. M'Williams' lamented death, performed the same office as respects foreign epidemics. On other occasions I have asked a friend to officiate in my stead, and Mr. Grainger, Dr James Bird, Dr. Richardson and Mr. Radcliffe as respects home epidemics, you may remember to have kindly and ably responded to my request. After all, on the question of the length of time during which it is desirable that the office of President should be held by one person, I must beg you to consider it as merely my individual opinion. Such at least it was until the last meeting of our council, when the matter was discussed and an affirmative resolution was passed on the subject. At the Royal College of Physicians it was thought wise that the presidency should change more frequently, and when the last President went out of office there was some notion that the next should be in like manner replaced by a successor at the end of one or two years.

Our present estimable President has, however, proved so acceptable to the college, that a week or two since he was, for a third time, unanimously elected, and I think it probable that the same feeling will prevail with regard to my successor here. An exception does not, however, disprove the propriety of the rule.

I wish now to offer you a few observations upon the degree of success which has attended the operations of this Society; in order to understand which, it is necessary that I should advert to its origin or history.

The original notion of our founder, Mr. Tucker, entertained and promulgated so early as the year 1848, under the feigned name of "Pater," in a February number of the *Lancet* of that year, was, that our profession should combine for the purpose of accumulating experience with respect to the treatment of cholera. It was an afterthought put forth in December, 1849, that a society should be instituted for the systematic investigation of epidemic diseases in general, such a society being a perfect novelty, for nothing of the kind previously existed. But there was a peculiar feature in our constitution. A notion was entertained that the public at large were more interested than the profession in carrying out such researches, as it was they rather than medical men who were to derive benefit from them. It seemed to follow as a consequence that they ought to contribute pecuniarily, at least as much as its professional members, to the Society's support. Laymen, and not only these, but ladies, were solicited to join our body as donors and as annual subscribers. It was even maintained that we ought to be subsidised by Government itself, and a contribution was actually solicited by a petition to the Prime Minister. Under the same view it was contemplated that our scientific researches should be regarded as altogether subordinate to our practical character, and that, in order that we might not be confounded with mere medical societies, we should adopt the more general title of an association.

What I thought at that time on this subject I find, on looking over my inaugural address delivered on December 2nd, 1850, to be contained in the following paragraph:—"Our labours, then, being connected with subjects of such universal interest, ought to ensure us the support of all classes of the community; and as our inquiries are of a nature which must involve considerable expense, if efficiently carried out on a scale commensurate with their importance, I cannot help feeling that our success will in a

great measure depend upon the encouragement and assistance which we receive from the public." I am at present, however, after mature consideration and greater experience, clearly of opinion that this was an erroneous view. Neither cholera in particular nor epidemics in general have a special title to be regarded in any other light than other diseases. The public have an indubitable right to expect that medical men shall, at their own cost, use every means in their power to render themselves acquainted with these, as with every other branch of professional knowledge, and all that the public can fairly be required to pledge themselves to is, to remunerate justly those who are called upon to apply in their service the knowledge which they have acquired.

Thus far, however, we may hope—that the public will assist us, by facilitating our acquisition of information, by affording us the opportunity of gathering facts from workhouses, hospitals, asylums, and other public institutions, and by giving us the privilege of visiting manufactories, ships, or other localities where epidemics may prevail. We may fairly too look to the Government for aiding us in the circulation of queries, for granting us the opportunity of consulting medical reports and returns, for placing us in communication with the medical departments of the army and navy, for bringing us, through the medium of our consulates, into friendly contact with foreign medical authorities, and for listening to our opinions as expressed in deputations and petitions. Beyond these modes of promoting our inquiries, it seems to me that we have no right to entertain expectations. We must support our character as scientific investigators, apart from all considerations of popular sympathy, or we shall lose our dignity and self respect, and, together with these, the influence and utility of our position and authority. Whatever may be the theoretical view on this subject—and I am quite aware that there is room for difference of opinion on it—certain it is that our attempts, which were at first strenuous, to induce lay members to make common cause with us, signally failed. We had no temptations wherewith to allure them. Gentlemen unacquainted with professional subjects could take little or no interest in our meetings; they could rarely make themselves useful on our committees, and they could not write papers for our transactions. Those, therefore, who have looked to a considerable increase of our funds from such extraneous sources will consider our efforts to have been much impeded by our want of success in these quarters.

Again, it is only a small fraction of our professional

brethren themselves who have shown an interest in the investigation of epidemics by joining our ranks. The great majority of medical practitioners are so fully engaged in the practical treatment of ordinary or occasionally of epidemic diseases, that they have little time for the more searching and scientific inquiries which we profess to undertake; and as medical societies are numerous, it would be a heavy tax on any professional man to subscribe to them all, and even more so, or I should rather say an impossibility, to attend their meetings; and where a selection is necessary we cannot expect to attract more than a limited share of support: at all events, more than a limited support in point of numbers we certainly have not had; though, if we may judge by quality and not quantity, we have every reason to feel satisfied. Our meetings, though seldom numerously attended, have ever been supported by members who not only take a lively interest in the welfare of the Society, but who possess such a knowledge and experience of the subjects which they assemble to consider and discuss, that to those present the discussions have been most interesting and instructive. From our paucity of numbers, our finances have fallen short of that amount which would have enabled us to carry out all the objects which we proposed to ourselves in the outset to embrace. What those objects were I shall now proceed to call to your recollection, in order to show how far they have been accomplished. I quote from a paper drawn up in 1850.

"To institute a rigid examination into the causes and conditions which influence the origin, propagation, mitigation and prevention of epidemic diseases. To institute, in a spirit of careful inquiry, original and comprehensive researches into the nature and laws of diseases connected with soil and climate; of epidemics, such as typhoid fever prevailing in towns, villages or rural districts, in public institutions, as workhouses, prisons, lunatic asylums and hospitals, in ships, barracks, and encampments, of epidemics like cholera beginning in a locality and spreading thence to distant countries, of the eruptive fevers, as scarlatina. To investigate the diseases prevailing extensively among domestic and other animals, as well as those that affect the vegetable kingdom. Immediately on the outbreak of an epidemic in any place, the Society will consider it to be its special province to trace with scrupulous minuteness the history of the first cases. The spread of epidemics will form another subject of inquiry, and under this head the influence of isolation and of unrestrained intercourse will be particularly investi-

gated. It will be a further part of the Society's province to ascertain the operation of existing legal enactments which bear upon epidemic diseases, such as those which relate to quarantine, to vaccination, to the sale of unwholesome or adulterated food, and to the removal of nuisances. To inquire into the effects of these enactments, and point out such alterations as may be necessary for the protection of the public health. The Society also proposes to communicate with the government and the legislature on matters connected with the prevention of epidemic diseases. They will solicit the active and organised co-operation of government boards, medical corporate bodies, public institutions, and medical societies, and will invite the formation of co-operating societies abroad and in this country, grafting the latter when practicable on existing medical societies. Lastly, it is their intention to receive, to read at their meetings and to publish, original papers and communications, to issue queries, to promulgate reports, to form statistical tables, to prepare illustrative maps, and to collect works connected with epidemic diseases."

It will thus be perceived that our scope and range were most extensive, and if we have not done all the works which we so planned out for execution, it must not be attributed to want of zeal or inclination on our part, but to the very restricted amount of funds at our disposal to carry out operations so extensive and so costly. To me it is rather a matter of surprise that we have done so much, as you will agree with me in thinking when I proceed to detail the result of our labours. Under these circumstances it is fortunate that bodies which have since been called into existence, and which have had greater means and powers at their command, have taken a considerable portion of our work out of our hands. I refer to the "Association of the District Medical Officers of Health," to the "British Medical Association," to the "Social Science Association," to the "Medical Department of the Privy Council," which has taken the place of the late Board of Health—and, I may add, to committees which have been recently formed by the Royal College of Physicians, and the Royal Medical and Chirurgical Society. These latter, if we except the Cholera Committee of the College of Physicians, have not yet, it is true, formed any committees for objects trenching upon those which we have had in view; but as they have established the principle, there is nothing to prevent their applying it hereafter in any direction.

It will at once be perceived that all the bodies which I have named have powers and have funds at their disposal which enable them to work under advantages that we cannot hope to rival. To instance the Medical Department of the Privy Council: they have made numerous inquiries into local epidemics; they have employed Dr. Seaton, Dr. Sanderson and others to make inquiries regarding vaccination extending over several years. Inquiries from the same authorities have been made concerning diphtheria, under Dr. Greenhow, who has in consequence, besides his public report, furnished an elaborate and excellent work on the disease, partly founded, as he states in his preface, on the study of diphtheria in public and private practice, and partly from information obtained in the course of an inquiry into the causes, symptoms, and treatment of the disease, made for the Privy Council in 1859. The subject of diseases among cattle, particularly epizootic diseases prevailing in this country, has likewise claimed the attention of the Privy Council.

The subject of quarantine again has been taken up by the Social Science Association, and under Dr. Milroy, as the secretary to the committee, has put forth voluminous and most valuable information on the subject. Still there is room enough for all in so extensive a field, and were I to be asked where our particular province ought to lie, I should say in the investigation of epidemics in general, as well those of past times as of the present, as well those which affect foreign countries as our own, and even in an especial manner those which respect foreign countries rather than our own. The bodies I have named look chiefly to our own country's benefit. Our views should be more extended. Through the medium of our military and naval members, as well as our corresponding members in foreign countries, we have already done much in this direction; and I cannot but think that by the instrumentality of our foreign secretaries, who have hitherto, with some exceptions, had little more than a nominal existence, we might, by a more extended and intimate intercourse with foreign medical practitioners, do a great deal more.

Adverting retrospectively to what we have accomplished, I may state that many committees have been formed by the council. Of these, the most important has been the Small-pox and Vaccination Committee, which still continues its operations. The first Report of this Committee was submitted to the Government in 1853, and printed by order of

Parliament. This Report exercised an important influence on subsequent legislation respecting vaccination. The reports of other committees, with one exception, have not been printed. Prior to the Society publishing a separate volume of *Transactions*, its use of type and the printing press was restricted. Since the publication of our *Transactions* in an independent form, one committee only has reported the results of its labours—the Diphtheria Committee. The Report of this Committee will be found in the first volume.

Of papers there have been read altogether 132, and these I have classed under the following heads:—

On cholera, twenty-eight papers.
On epidemics in general, thirty papers.
On yellow fever, ten papers.
On other fevers, including plague, seventeen papers.
On small-pox and vaccination, ten papers.
On diphtheria, nine papers.
On quarantine, three papers.
Miscellaneous papers, including reports, twenty-five.

Of these papers we have effected the publication of forty-three—namely, eighteen under the head of "Transactions of the Epidemiological Society," printed separately at the end of each number of Dr. Richardson's *Journal of Public Health and Sanitary Review*. This was a most economical and convenient method of bringing our papers before the world, and it was continued as long as the journal itself existed, but unfortunately this very creditable periodical proved not to be remunerative, and was therefore discontinued, if I remember rightly, at the end of the year 1859. From that time forth we have been thrown upon our own resources, and I venture to think that it is much to our credit, small as our funds have been, that we have been enabled to publish twenty-five more of our papers, thus forming a very respectable volume.

It only remains, gentlemen, for me to return you my sincere thanks for the indulgence that you have ever shown me in my capacity as president, and to express my conviction that you will find in my successor a gentleman who is in all respects worthy of your confidence and support. At the commencement of a new rule it seems a fitting occasion that we should all resolve to redouble our exertions in our good cause. For myself, I can assure you that I shall as much as ever have the interest of the society at heart, and that I shall still endeavour to be a constant attendant at its meetings.

ON AN ANOMALOUS FORM OF ERUPTIVE DISORDER, WHICH IT IS PROPOSED TO DESIGNATE *RUBEOLA NOTHA*.

By Dr. BABINGTON, F.R.S.

[*Read 2nd May*, 1864.]

The purpose of this short paper is to bring to the notice of the Society an eruptive disorder or exanthem of an anomalous character which has, within the last few weeks, been so prevalent, at least in London, as to entitle it to the designation of an epidemic. I have myself seen several cases, and I have heard of many more as having been observed by other practitioners.

It is a papular eruption, in many respects resembling rubeola; but in all the cases seen by me, there has been satisfactory evidence that the individuals affected have previously had that disease. It is ushered in during several days by constitutional disturbance, headache, loss of appetite, febricula, coryza, and sneezing. When the eruption appears, the papulæ are less distinct than those of rubeola, are not arranged in crescentic clusters, and appear on the face and trunk, but not upon the upper or lower extremities, or at most very slightly. The general febrile symptoms are somewhat relieved by the external eruption, which is most vivid on the second day of its appearance, but does not entirely disappear until the third.

There is more constitutional disturbance in proportion to the extent of the eruption than in rubeola, but the convalescence is more speedy and complete. From roseola it differs in not being symptomatic of any other disorder, and in being papular in character, the papulæ appearing in circumscribed patches, which are more dusky in hue than the diffused efflorescence of roseola. There is also more marked congestion of the head, and less irritation of the stomach; moreover, the complaint runs a more definite course. From scarlatina the disease differs inasmuch as the eruption is essentially papular—not a general efflorescence—and that there is little or no soreness and no ulceration of the throat.

The prognosis of the affection is favourable; and so far as has been hitherto noticed, it has not been followed by any morbid condition of the kidneys.

With respect to treatment, the feverish symptoms by which it is preceded and accompanied are best met by cooling salines, diluent beverages, and a light diet. Gentle aperients are occasionally required but, during the eruption, spontaneous diarrhœa sometimes occurs. The debility during convalescence, which is considerable, indicates the employment of tonics and stimulants.

From the general resemblance of this eruptive epidemic to rubeola, I would propose to designate it "Rubeola notha," or bastard measles.

From this very imperfect and short descriptive outline, the Society may, perhaps, deem it worth while to call for further information from their professional brethren, and to collect cases. It will be interesting to inquire whether the epidemic has been confined to the metropolis and its neighbourhood, or whether, as is more likely, it has extended throughout the kingdom, or been observed in other countries. The disorder, though comparatively unimportant in itself, still merits at our hands to be observed accurately and duly recorded. It is only through the independent efforts of many, that a comprehensive knowledge of it can be obtained, and it must be borne in mind that though trivial in itself, it may be the precursor of some other epidemic of graver import.

Notes on an anomalous form of Eruptive Disorder prevalent at Malta since 1861.

(Communicated to Dr. Babington by Dr. Mackay, R.N.)

Previous to our arrival at Malta, towards the end of 1862, I had heard that there was an epidemic in the place, and that it was chiefly characterised by very slight premonitory symptoms as a rule, and by an eruption after a day or two of a very peculiar character. Like rubeola in some, scarlatina in others, and a mixture of the two eruptions in a third. No name was given to it. Shortly after our arrival I found that H.M.S. "Edgar" had one or two cases of it, and that in one (the assistant-surgeon) the febrile symptoms ran very high. We were not long at our moorings before two cases presented themselves. In both the premonitory symptoms were exceedingly mild; in both there was chiefly some malaise, with a little headache and nausea. The appearance of the eruption was contemporaneous with the subsidence of

the febrile symptoms. The eruption was exceedingly profuse, and was very much like a rubeolar eruption on a scarlatinal ground. Face, arms, body and legs were copiously covered with it. The appetite remained good, and the functions normal. The urine was examined in one case. Only a very few crystals of uric acid were discovered under the microscope. It contained no albumen, nor did it present any other abnormal condition. Some of the cases on shore were complicated with cynanche.

This was a regular epidemic of roseola, a disease which, although at certain seasons common enough in isolated cases, rarely, so far as I am aware, prevails as an epidemic. I see that Grisolle takes some pains to point out the distinguishing characters which render its diagnosis from rubeola easy, but he dismisses the question of its being mistaken for scarlatina, by simply stating that there is no difficulty whatever in distinguishing between them. (*Traité Elémentaire et Pratique de Pathologie Interne*, 6me edit. tome i, p. 549.) I must say, however, that I am not quite so certain upon this point, and I do not think it would argue any great want of judgment or experience in any medical man who should hesitate to decide hastily upon the specific character of an eruption which made its appearance after a few days of fever, however slight, and which was accompanied with cynanche, and followed by a certain amount of desquamation. There can be little doubt that the eruption of roseola varies very much in different cases, and although as a rule it more nearly resembles rubeola than scarlatina, in some instances it no doubt presents very much the appearance of the latter exanthem.

This eruption has made it appearance in one of our ships. The surgeon says, " for the last three weeks there have been cases of an exanthematous disease, of the nature of which I am not clearly certain. The attacks are mild, and seldom remain more than two or three days. I have put it down on the list as urticaria, but it is not that exactly. It has none of its features, and it also appears nearly allied to rubeola, but it certainly is not that disease. There are in some of the cases slight—very slight catarrhal symptoms, in others none at all; and it occurs in patients also who have had rubeola before. The eruption is of small red pimples, very closely packed together all over the body and on the face, occasionally desquamating. There is no headache and no general debility, and hardly any febrile symptoms. The eruption appears to come out in some cases without any

previous affection. In others, the night before, slight headache and general feeling of uneasiness are complained of. The treatment is of the simplest nature. A dose or two of rhubarb and magnesia completes the cure."

ALEX. G. MACKAY, M.D.

Since July 1861, when I first assumed the duties of medical officer of H.M. Dockyard at Malta, many anomalous eruptive fevers fell under my notice. In the autumn of 1862 there was an epidemic of slight fever, accompanied in almost every case by an efflorescence on the skin, and in the majority of cases that efflorescence resembled roseola, though in some instances I observed an urticarious eruption, and in others patches of erythema. Nothing like regularity in the preliminary fever, or in the character and duration of the rash, was observed by me; but in no instance did the febrile symptoms continue beyond six days, nor did I note a single case where the eruption was visible beyond three days continuously, although there were instances of the recurrence of the eruption after it had disappeared entirely. Sore throat was present in many instances, but the blush on the fauces was not so bright as in scarlatina, nor was the scarlatinal tongue ever observed. Suffusion of the eyes and congestion of the nasal membrane were frequent accompaniments of this fever, but my observations do not allow me to associate these symptoms with any particular character of rash. Children were most frequently affected, though adults by no means escaped, particularly around the creek where the dockyard artisans chiefly reside. The disease was very prevalent, and frequently attacked all the inmates of a house. In the autumn of 1863 a similar eruptive disease was more prevalent than in the previous autumn. Its characters were very similar, but more severe. The head symptoms of the preliminary fever were very marked, but did not in any case amount to delirium. The headache and vertigo were constantly complained of during the early days of the disease. The distinct papular rash was most common, usually of a bright colour, though in some cases the papulæ were of a duskier hue; the eyes were much suffused, and severe aching of them was always much complained of. The adult population suffered more than children in the epidemic of 1863, and one marked distinction of that epidemic from the previous one was, that the prostration and debility attendant on the fever were infinitely greater and out of all proportion to the duration of

the disease. The convalescence was not so complete, and was attended by rheumatoid pains in the limbs, lasting frequently for two or three weeks after the fever had subsided. No other secondary affection fell under my notice.

Since the commencement of May 1864, eruptive fever has shown itself among the dockyard children, and about thirty cases have been under my treatment. No case has yet occurred among adults in this yard.

Among the cases now occurring, the rash has been very frequently urticarious, and has disappeared after the action of an aperient. There have been several cases, however, more resembling measles than I have noticed before, and in them the rash is more persistent, and the affection of the eyes and nasal membrane more marked. The papulæ in some of the children seen to-day were small, distinct, slightly raised, and of a dusky hue, disposed irregularly, but forming no distinct patches. The febrile disturbance is trifling. I may observe that whooping cough is at present epidemic in Malta, and that in the dockyard school to-day, where the children number eighty-five, 25 per cent. are absent, suffering from whooping cough and the eruptive fever above described.

I have noticed no sequelæ to the fever during the period they have been under my observation, nor have I seen or heard of a fatal case.

I have always reported these fevers as febriculæ, showing irregular and badly defined eruptions on the skin, and have never considered them to be specific exanthems.

The simplest treatment is sufficient for their cure. The only really necessary point seeming to be a thorough evacuation of the bowels. In the epidemic of 1863 occasional cases required cold applications to the head in the early stages and tonics in the later ones, but in the majority, after the action of an aperient, the acetate of ammonia mixture with nitrate of potass was all that I deemed it necessary to prescribe.

THOS. RUSSELL PICKTHORN, R.N.

REPORT ON EPIDEMICS IN GREAT BRITAIN, 1863.

By J. N. RADCLIFFE.

[*Read May 2nd*, 1864.]

The report which I last laid before the Society referred to the fourteen months ending 31st November, 1862. The present report refers to the fourth quarter of 1862 and the year 1863. In subsequent reports it will unquestionably be best, as in the report which I am about to submit to the Society for 1863, to include, for the purpose of ready comparison with the detailed reports of the Registrars-General of England and Scotland, the twelve months from the 1st of Jan. to the 31st December. It has been customary for the Secretary to prepare a report on epidemics for the beginning of each Session. I did not feel at liberty to alter this arrangement at the beginning of last session. But as no advantage is obtained by the arrangement, and, from the plan which I have adopted in drawing up the report, a manifest disadvantage arises from the want of correspondence of the periods included in the reports with that included in the annual reports of the Registrar-General, I have postponed reading the report for the present session, until the mortuary returns for the past year were completed. I had hoped by this postponement, moreover, to have been able to preface the report with an account of the status of epidemic disease in England during the decennium 1851-60. The medical officer of the Privy Council, in his fourth annual report, published in 1862, wrote, "Eighteen months ago, with their lordships' authority, I brought under the consideration of the Registrar-General that very great help would be given to the progress of sanitary investigation if he (having regard to the then approaching census of the population, and to the facilities which it would afford for the calculation of accurate death rates) would cause to be prepared a *digest of all the mortuary returns relating to the intercensual period* 1851-1861, with such distinctions of *age and sex*, and such a classification of *causes of death*, as would enable the student to estimate at least with approximate precision, how far each district in England is affected

by the several chief sorts of morbific influence. The Registrar-General with his invariable willingness to assist inquiries of this description, resolved to make the suggested compilation. I have reason to believe that it is now in an advanced state of preparation, and will at no distant period be completed. Ample means will then exist, and be universally accessible, for measuring the amount of mortal injury which different local influences inflict on different sections of our population." This important document I had been given to understand would in all probability be published soon after the opening of the present session of Parliament, and I was anxious to make use of the data which it would yield concerning epidemics in the preparation of the present report. The document was published late in the past quarter, but since its publication I have ascertained that a much more extensive analysis of the mortuary returns of 1851-60 is in course of preparation by the Registrar-General for England, and will be published about June. The latter analysis will differ materially in its arrangement from that which has been prepared for the medical officer of the Privy Council. It will also include data respecting epidemic diseases which the last-named analysis does not contain. Under these circumstances it is necessary that I should postpone any attempt to lay before the Society an account of the status of epidemic disease in England until the publication of the Registrar-General's further analysis of the mortuary returns for 1851-60. In the meantime, however, I shall make use of such data in the analysis already published as may throw additional light upon the epidemiology of the past year.

Before proceeding to the subject matter of this report, I would repeat the remarks which I made at the commencement of my last report. I then said, "In respect of epidemics, this report is necessarily based on the different returns of the Registrar-General of England and Scotland, published during the period to which it relates. The information contained in these returns on outbreaks of epidemic disease, at the time of, or soon after, their occurrence, is very imperfect. No other source of information, however, exists, or if existing, is accessible. I propose to bring the different facts on epidemics together in one connected view. The history thus formed will fall far short of what a scientific annual record of epidemic diseases should be; but the first step towards a more perfect history must be the systematic collation of existing materials."

I may add, that the information contained in these returns is furnished by the local registrars in accordance with the following instructions :—

Instructions to Registrars (England).—"If the deaths registered during the quarter have been above or below the average, state whether, in your opinion, the fact is wholly or partially accounted for by sanitary arrangements, by increase or decrease of population, the weather, small-pox, measles, scarlatina, whooping-cough, fever (including typhus, typhoid, relapsing, infantile fever), cholera, diarrhœa (including bowel complaint), dysentery, bronchitis, or other disease. Also with regard to increase or decrease of births, you may mention any circumstance to which it may be attributed. By 'average' must be understood *not* the average of numbers in other quarters of the year, but the average of *corresponding* quarters in four or five previous years."

Instructions to Registrars (Scotland).—"If at any time the births, deaths, or marriages registered during the quarter have been above or below the average, state whether epidemics, such as measles, typhus, cholera, etc., have prevailed in the district; or if there is anyoth er fact in the character of the weather, sanitary arrangements, movements of the population, etc., which will account for the circumstance."

The local registrars are alone to be considered responsible for the opinions they express, and the value of their statements epidemiologically is to be determined solely by a comparison with the detailed reports of the Registrar-General. My last report (the first laid before the Society upon the present plan) referred chiefly to 1862, but the detailed mortuary reports for that year are not published.

The health of England in the first three quarters of 1862 was unusually good, so far as an estimate may be formed from the low rate of mortality which prevailed. The health of Scotland was below the average. *Scarlatina*, which had prevailed widely in the northern counties of both England and Scotland in the last quarter of 1861, became active in the southern counties of both countries in the third quarter of 1862. *Measles* broke out in many localities in the northern and southern districts of England, in the winter (first) quarter, and in some instances was very fatal. In Scotland the disease was prevalent in the spring and summer quarters. *Diphtheria* prevailed more or less in every registration district during the nine months. In Scotland the disease, together with sore throat, was epidemic throughout the year. *Whooping-cough* was widely prevalent in England

during the winter quarter; in Scotland, during the winter and spring quarters. *Influenza* was epidemic in Scotland in the last quarter of 1861 and first quarter of 1862. *Small-pox* broke out in many districts of England, and most especially in the eastern, south-western, and northern counties, and in Yorkshire. A remarkable epidemic of *typhus*, which had commenced in 1861, prevailed throughout the nine months in London. None of the outbreaks of the diseases referred to as occurring in England, assumed what may be termed general proportions; they were truly local irruptions.

THE LAST QUARTER OF 1862.

England. In the last quarter of 1862, the rate of mortality rose above the average. Food was cheap; the weather fluctuating. The beginning and end of the quarter were unusually warm; the middle unusually cold. At Greenwich, "the mean temperature of October was, with two exceptions, higher than it had been in the same month since 1847; that of November was lower than it had been in the same month since 1829, two Novembers excepted; and December was warmer than the month had been since 1843, with the exception of three Decembers in that period." A cold period set in suddenly on the 6th of November, and persisted until the 2nd of December, the mean temperature of the period being 4·5° below the average. A period of unusual warmth, in which the daily excess of temperature was 4·5°, followed, and continued to the end of the year. The fall of rain was slightly above the average of the three months.

The death-rate of the quarter was 2·226 per cent., against an average of 2·171. The increased mortality was attributed to the sudden invasion of cold in November, and the abrupt succession of heat. The remarks of the Registrar-General on the mortality of the quarter, require to be quoted at some length:—

"The North-Western counties, Yorkshire, London, the Northern counties, the West Midland, are five divisions in which the highest rate of mortality prevailed. In the first, which contains the districts of the cotton manufacture, the rate (2·66 per cent.) was higher than in any other division. This distinction is not of recent birth; it is not the fruit of adverse circumstances, but has sprung from causes which have been in operation since Liverpool, Manchester, and other towns in what has been called the worst drained part of England, rose into importance as seats of commerce and manufacture. But whatever be the sanitary condition of

the towns and villages they inhabit, human beings must be affected by the atmosphere in which they are immersed, and the effects of which they can but partially control; and as the cotton districts participated with the rest of the kingdom in the benefit of a healthy summer, they have also suffered, like other parts, from a less healthy autumn. The mortality rose from 2·46 per cent., the mean rate of the two previous autumns, to 2·66 per cent., but in London it also rose from 2·22 to 2·44. Further, the mortality did not increase quite so much in Lancashire and Cheshire as it did in Yorkshire.

"The Registrar of Preston sub-district reports that typhus became prevalent there in the early part of October; it excited the most serious apprehensions, and, notwithstanding the greatest efforts to check its progress, forty-eight cases proved fatal. Dr. Buchanan in his report pronounced it to be of the Irish type, "the steady follower on famine"; he found a decline from the normal standard of health among the unemployed operatives of the cotton towns, and that scurvy and other symptoms of a hæmorrhagic tendency had been manifested. On the other hand, the report of the Central Executive Committee (for the relief of distress), dated 19th January, states that the middle of winter had been gained without the outbreak of any serious epidemic, or the appearance of scurvy, diarrhœa, or dysentery, forms of disease that follow prolonged low diet, and the use of coarse food without much variety. The Registrar of Chorlton-upon-Medlock writes that notwithstanding the great number of persons unemployed, no epidemic has prevailed, nor any disease resulting from privation; that the poor are provided for liberally and with "wise economy." Scarlatina and diphtheria, and also diarrhœa, prevailed to a considerable extent in Manchester. An increase of deaths in Ashton-under-line is attributed to scarlatina and measles. Scarlatina caused eighty deaths, being a third part of the total number, in Oldham-above-town; these occurred not only in the working class, but in the general population. In Blackburn and in Witton, which is also in the Blackburn district, the mortality was increased by measles and bronchitis; and at the latter place there was "much sickness in consequence of the damp weather." The mortality in the Chorley sub-district was nearly doubled, chiefly by measles; and the weather, "mild and damp," was considered unfavourable to health.

"It will tend to strengthen the conclusion that the increase

of mortality in Lancashire in the last quarter was not caused directly by famine, nor indirectly by diseases induced or aggravated by it, if it be stated, in addition to facts that have been mentioned above, that of the twenty-six districts, of which that county is composed, while a certain number exhibited an increase of deaths over those of the corresponding quarter in 1861, there was in an equal number of districts an actual decrease. The districts of Bolton, Manchester, Salford, Burnley, and Preston are amongst those that stand in the latter more favourable category. The munificence of the nation, aided by its kinsfolk in other lands who "have brought their food from afar," has hitherto averted the last, direst extremity, the death of a people by famine. Amongst elements of the situation that have been conducive to health, are the cheapness of provisions, a winter in great part unusually mild, increase of maternal care, recreation out of doors, and perhaps, for many men and women who were not robust, a season of needful rest. The future of "the cotton-famine" is still undetermined,—in the language of the Central Executive Committee it may be even "full of gloom and uncertainty," and "to chill the sympathy or arrest the efforts" that have been evoked would be rash,—but that which is past may be subject of congratulation; and it is now known that the history of the distress "is not written in the death-registers of the year that has closed."

The apprehensions of the Central Executive Committee have happily been falsified by events. I gave some account of the outbreak of *typhus* in Preston in the autumn of 1862, in my last report. The disease also manifested itself in Manchester, Salford, Blackburn, Accrington, and Chorley. Dr. Buchanan communicated to the Society a history of the outbreak of typhus in Lancashire in the course of the past session.* I quote the following remarks respecting epidemic diseases in the cotton-manufacturing districts from a report made by that gentleman to the Privy Council, on the sanitary condition of the cotton towns of Lancashire and Yorkshire, *apropos* of the cotton famine:†—

"Epidemic diseases," he says, "fostered as they are by bad diet, bad air, and want of cleanliness, constitute a further index to an exceptional prevalence of those agencies. Putting aside sporadic cases, the following complaints were

* See p. 17 of the present volume of Transactions.
† See Fifth Report of Medical Officer of Privy Council, p. 303.

met with in an epidemic form:—Chicken-pox in a part of Manchester; measles in Ashton, Blackburn, Bury, Chorley, Manchester, and, to a less extent, in Salford, Preston, and Wigan; whooping-cough in Chorley, Manchester, Salford, and Stockport; scarlatina in Ashton, Darwen, Manchester, Oldham, and a month or two before in Stockport; typhoid fever frequent in Bolton, Bury, Chorley, Darwen, and Stockport; four typhus cases seen in Preston, Manchester, and Chorley. Of chicken-pox, whooping-cough, and typhoid no further mention need be made. Measles has been characterised in Ashton and Chorley by the singular amount of diarrhœa accompanying it; there, as well as in Blackburn and Bury, by the unusuality of its long complication. Ophthalmia, as frequently attendant on measles in Chorley, has been before mentioned. Scarlatina in each place of its occurrence has been distinguished by the extreme degree in which it has affected the mucous membranes. Very bad throats, with nasal discharges and glands in the neck greatly swollen, have been commonly observed; and in some places, as at Oldham, have given a highly fatal character to the epidemic. In this town of 72,333 inhabitants, no fewer than 169 deaths were registered between midsummer and December 1st.

"Some typhus [to interpolate one or two passages from the earlier portion of the report] has made its appearance, The prosperous towns of Lancashire have been wholly exempt from typhus fever (of the true Irish type) since 1847-8, when it prevailed epidemically, and was fatal to an extent only exceeded among the starving population of Ireland. In the present year this steady follower on famine has again appeared, and at Preston and, Manchester has assumed an epidemic form. Those cases of the summer have multiplied, and some in the autumn. At Preston 227 cases of this form are known to have occurred between midsummer and the end of November; and those attacked have died at the rate of about 23 per cent. In Manchester there have probably been at least 100 attacks and twenty deaths in the same period. The existence of typhus gives perhaps the strongest evidence of a deteriorated physical state among the unemployed operatives."

In this quarter the prevalence of *measles* was reported from thirty registration districts, *scarlatina* from sixty-two, *diphtheria* from sixteen, and *small-pox* from nineteen. The districts affected by measles were most numerous in the west midland (six) and north-western counties (five); by scarla-

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tina in the north-western (twelve), south-western (nine), and west midland (eight); by diphtheria in the eastern (three), west midland (three), and north-western (three). The districts affected with small-pox were in the south-western (five) and northern counties (four), and Yorkshire. Ten of the nineteen infected districts were in Yorkshire.

The Metropolis.—The deaths from zymotic diseases in the last quarter of 1862 were largely in excess of the two previous corresponding quarters. The mortality from small-pox (192) was greater than in 1860 and 1861; and the deaths were more numerous in the latter than in the earlier weeks of the quarter. Scarlatina, the most fatal epidemic disease of the three months, caused 1165 deaths. The mortality from this disease in the last quarter of 1861 had been 1145; of 1860, 602. Diphtheria was less fatal than in the like quarter of 1861, and occasioned 202 deaths. The mortality from measles (900) was largely in excess of the corresponding quarters in the four previous years. There was a diminution in the mortality from whooping cough. Finally the deaths from continued fevers amounted to 796. The mortality from these maladies in the fourth quarter of 1861 was 624; of 1860, 558; of 1859, 311; and of 1858, 559. The source of the increased mortality from continued fevers I shall refer to in a subsequent part of this report.

Scotland.—The weather was more boisterous in Scotland during the last quarter of 1862 than in England. There was an unusual prevalence of high winds and an excessive fall of rain. But the march of the temperature presented the same general characteristics as in England. The mean temperature of October and December was above the average, and the weather in both months was comparatively mild. The mean temperature of November was nearly 3 degrees below the average, and lower than the average of December. Severe cold set in in November, accompanied by snow and ice; while in December south-western breezes prevailed, so that the month felt balmy and warm after the stormy November.

The death-rate was considerably above the average, being at the annual rate of 209 as compared with 202 in 10,000 population. There was even a larger amount of sickness among the population than the mortality, great as this was, indicated.

"The sudden changes of weather," says the Registrar-General, "attended with high and piercing winds, and the severe wintry weather during the second week of November,

following as it did months of unusual coolness and humidity, induced much general sickness, in some cases assuming the form of influenza, in others of febrile attacks, and in others affections of the respiratory organs. In some instances, too, it induced outbreaks of diarrhœa. Sore throats were unusually prevalent, in several cases assuming the diphtheritic type; while diphtheria itself seemed to be on the increase, and in some districts largely contributed to the mortality. Croup, too, was unusually prevalent, and in numerous instances appeared to pass into diphtheria; if the croup itself were not in these instances but a symptom of the presence of the latter disease. Over all Scotland, gastric and typhus fevers seem to have been prevalent; and among children, measles in the northern half of Scotland, and scarlatina in the southern, seem to have been the prevalent epidemics. Small-pox in several districts appeared as an epidemic, but in none, in so far as the registrars' note show, does its prevalence and fatality appear to have equalled its outbreak in Edinburgh and Leith. It is greatly to be desired that some legislative enactment were passed for enforcing vaccination as a purely protective measure."

Epidemics in 1863.

1. The Weather.

First Quarter.—England.—The weather was singularly warm. With the exception of eleven days in March, the daily temperature was in excess, on an average, $4\frac{3}{4}$ degrees. The winter was one of the warmest on record. The mean temperature of the three months, viz., December, January, and February was 42·5. "In the preceding ninety-two years," writes Mr. Glaisher, "the warmest winter of all was that of 1795, its mean temperature was 43·2; this was closely approached in the years 1834 and 1846, in each of which the value was 43·1; and these are the only instances of higher temperature since the year 1771." In the year 1848 the temperature of the same period was 42·4 closely approximating to the present. The month of March this year was also warm, which was not the case in the year 1795. The mean temperature of January, February, and March was 42·6. In 1834 the mean temperature of the same months was 42·9; in 1846 it was 43·6; and these are the only instances, as far as trustworthy records extend, of an increase above the average temperature of the first months of 1862. All over the country the weather in Feb-

ruary and March was remarkably fine and mild. The *fall of rain* in the extreme northern parts of England in January was somewhat in defect; about London it was a little over the average, and north of 53 degrees it was in excess, and very much so at northern stations. At Belvoir Castle, in January, primroses, aconites, hepaticas, and rhododendrons were in flower, and thrushes was heard singing as in spring.

In *Scotland* "it can scarcely be said there was any wintry weather." The mean temperature of the quarter was much greater than usual. In January and February the humidity of the atmosphere was above the average, and much rain fell. "Frosts and snow were almost unknown." The mean temperature of January was 1·4, and of February 4·5 above the average of the previous November. January and February are usually the coldest months in Scotland. The mean temperature of the quarter was 40·9. (January, 38·5; February, 41·2; March, 42·9).

Second Quarter.—England.—The mean temperature of April was 49·1, being higher than in any April since 1844. The mean temperature of May was 52·0, being 3·4 lower than in 1862, and of nearly the same value as in 1861. The mean temperature of June was 58·1, being 1·8 higher than in 1862, and is lower than in 1861. The temperature of the five months ending April 1863 (44·2) was as high as any like period on record. The nearest approach to this high temperature was in the period ending April 1796, when the mean was 43·4; in 1854 it was 43·6; in 1846, 43·9; and in 1859, 43·5. The days and nights in April were warm, and the nights in May; and the days in June were cold. The humidity of the atmosphere and barometric readings were about the average.

Scotland.—April was cloudy, windy, and rainy; the barometric pressure low but steady, and the mean temperature (44·4), 0·9 above the average. This increased temperature arose more from the absence of cold nights than the occurrence of hot days. May was cloudy, windy, and rainy, the mean temperature (48·6) being 1·1 below the average. June was also cloudy, dull, and rainy; the barometric pressure being low, and the mean temperature (54·0) 1·6 below the average. The range of temperature was also small.

Third Quarter.—England.—From July 1st to 15th, excepting two days, the temperature of the air was in excess of the average to the amount of 2¼ degrees. A cold period followed, which continued till the 1st August, during which

the average daily deficiency amounted to 3¾ degrees, and was then followed by a warm period, extending till the 16th August, the excess of temperature amounting to 3½ degrees. On July 19th the temperature fell to 32·0 in the air and to much lower on the ground at most places north of London.

A generally cold period extended from the 17th August to the end of September, a period of forty-five days, during which the daily deficiency amounted to 2¼ degrees.

The mean temperature of July was 60·8, being higher than in 1862, when it was 59·1, and lower than in 1861, when it was 60·9.

The mean temperature of August was 61·9, being higher than any August since 1858, excepting the years 1859 and 1861, which were 63·5 and 63·2 respectively.

The mean temperature of September was 53·7, being lower than any September as far back as 1841, with the exception of 1845, when it was 53·6, and 1860, when it was 53·4."

The days were warm in July and August, and the nights also in August; in September, both days and nights were cold. The fall of rain in the quarter was 1·6 inch below the average of preceding forty-seven years.

Scotland.—In July the barometric pressure and range of temperature were unusually high. The mean temperature (56·1) was 0·6 less than the average. The month was one of excessive drought. The amount of northerly wind was beyond all precedent. In *August* abundant rain fell. The mean temperature (55·7) was 1·5 below the average. In September the month was cold, rainy, and windy; the barometric range being beyond all former precedent, and the mean temperature (50·1) no less than 3·0 below the average.

Fourth Quarter.—"Till October 9th the temperature was alternately warm and cold. On October 10th a warm period set in, and continued to the 22nd inclusive, the average daily excess of mean temperature was nearly 5·0; the weather then changed, and till November 13th the weather was variable with respect to warmth, some days being in excess of temperature to a considerable amount, and others below, but the latter preponderated; and the daily deficiency of warmth for the twenty-two days ending November 13th was rather more than 1 degree daily. From this time to the end of the quarter there was an excess of temperature over the average, amounting, for these forty-eight days ending

December 31st, to 1½ degrees daily. The same excess of temperature extended over the country. The period from October 30th to the beginning of December was unusually stormy, even for the time of the year. Successive gales of wind occurred till November 4th. Other severe storms took place all over the country on November 21st and December 2nd and 3rd. On October 30th the heaviest pressure within the preceding twenty years took place, viz., one of 29½ lbs. on the square foot. On December 3rd, at Greenwich, at 7h. 30m. A.M., the barometer reading was 28·79 in., and remained at this reading for 42 minutes, then turned to increase, and was 30·22 in. by noon on the 4th; at Castleton the increase was 1·1 in. in thirteen hours; at Cockermouth, between December 3rd, at 9 A.M., and December 4th, at 9 A.M., was 1·34 in. So that the increase from the 3rd to the 4th all over the country was extraordinary. The variations of atmospheric pressures between October 27th and December 5th were very frequent and to large amounts.

"The mean temperature of October was 51·6, being nearly the same as in 1862, when it was 51·8, and less than in 1861, when it was 54·9.

"The mean temperature of November was 45·7, being higher than any November since 1857, which was 45·8.

"The mean temperature of December was 43·2, being 0·4 less than in 1862; higher than in 1861, which was 41.0; and higher than in any other year back to 1857, which was 45·1."

The nights were warm throughout the quarter. The fall of rain was below the average. In the south midland counties polyanthuses, coloured primroses, violets, carnations, wallflowers, coltsfoot, and monthly roses were blooming when the year came to a close. In the north the leaf-buds of some deciduous trees were much expanded on the 24th of December, and primroses and ranunculas flowered the same month. In the midland counties, violets, primroses, daisies, and hepaticas were blooming towards the new year.

Scotland.—In October the weather was nearly normal. There were large fluctuations of cold, wet, and cloud, and the mean temperature (46·8) was a fraction (6·0) less than the average. In November the mean temperature (43·1) was remarkably high, being 3·5 above the average. In December also the mean temperature (40·8) was high, being 2·1 above the average. The rain was greater than usual, and there was much tempestuous weather, the wind being "violent and continuous far beyond the average of former years;

and lightning so abundant and auroras so deficient as to have in these respects more the appearance of summer."

2. FOOD.

Food in England, with the exception of fresh meat, was cheap throughout the year.

3. THE HEALTH OF THE COUNTRY AND GENERAL MORTALITY.

First Quarter.—Notwithstanding the mildness of the weather, the winter quarter was remarkably unhealthy both in England and Scotland. The rate of mortality during the quarter in England was 2·546 per cent., the average being 2·498. In Scotland the death rate was 2·48 per cent., the average of eight previous years being 2·36. "The long-continued wet weather during the previous year," says the Scottish Registrar-General, "the greater humidity of the atmosphere, and the want of the usual bracing dry frosty weather, no doubt, contributed to weaken the constitutions of the people, and render them more liable to attacks of disease, and sink under it when attacked." The increased mortality arose not from the prevalence of any particular epidemic, but from the greater general increase of all complaints, and the greater fatality of all. In all the English registration divisions the deaths were more numerous, as compared with the corresponding quarter of the previous year, with the exception of the north-western division—that division in which the "staple industry on which a million of persons are dependant was overthrown, and when for a twelvemonth four-fifths of that number had subsisted, unless the pittance had been aided by previous earnings or sale of household stock, on less than fourpence a-day per head." On comparing the deaths of the quarter with the mean number of two corresponding quarters in 1861-62, the increase of deaths for the whole of England was nearly 2 per cent.; for London and the north midland counties, 2·5 per cent.; for the south-eastern and south midland counties, and Yorkshire, 7 per cent.; for the east, south-west, and west midland counties, about 12 per cent.; while for the north-west division the increase (0·3 per cent.) hardly appreciable; and for Lancashire, which constitutes the most important part of it, an actual decrease of mortality was found. If the sixteen most important cotton districts of Lancashire are taken, there was an increase of deaths in five, a decrease in the remaining eleven. The increase was greatest in Chorlton (16 per

cent.) and Oldham (21 per cent.). The decrease was great in Wigan, Warrington, Leigh, and Bury, in which places it was 17 and 18 per cent.; greatest in Preston and Burnley, where it was 20 and 24 per cent. It is suggested that these remarkable facts may probably be explained by the considerations, that, (1) while in 1861-62, during the winter quarter, England enjoyed an average amount of health, Lancashire was more unhealthy than usual; that (2) the great emigration from the famine-stricken districts might diminish the mortality; and (3) that the liberal provision spontaneously made for the relief of the unemployed sufficed to ward off physical distress.

Second Quarter.—The mortality in both England and Scotland still exceeded the average. In England the death-rate was 2·313 per cent. per annum., whilst the average was 2·191. The rate of mortality had not been so high in a spring quarter since 1853. In Scotland the death-rate was 2·31 per cent., the average of the corresponding quarters in the eight previous years being 2·12 per cent. The exaggeration of mortality in Scotland is partly assigned to the prevalence of measles and diphtheria. The exaggeration of the mortality in England is attributed to the sudden increase of cold in the midst of the quarter, after summer-like weather. The mortality in the north-western counties (Lancashire and Cheshire) was 9 per cent. above the mean of the corresponding quarter of 1861-62. But the increase of mortality in these counties was less than in Yorkshire, where the excess was 13 per cent. The distress in the cotton districts was largely mitigated, and forty-seven local committees were able to suspend operations before the close of the quarter. The Registrar-General justly remarks that "It must be regarded as a providential interposition in favour of the under-fed and half-clad workmen and their families, that the period embracing December and four succeeding months was, in the words of the meteorological report, distinguished by a temperature higher than in any corresponding period since 1771."

Third Quarter.—The population north and south of the Tweed continued most unhealthy. The mortality of England still ranged above the average The excess of deaths may be stated in round numbers as at least 23,000. The death-rate was 2·166 per cent., whilst the average summer rate is 1·982. The increase of mortality extended to every division of the kingdom, the highest rate being found in Yorkshire (2·446) and Lancashire (2·431). The death-

rate in the two districts was 2·404 per cent. against an average of 2·239. The mortality of the country districts was, as usual, considerably less; but it was also much in excess of the summer average, for it rose to 1·864 against 1·694. "It is obvious," says the Registrar-General, "that cities are not the only haunts of those diseases that are propagated by foul air and bad water, and in homes of penury; nor are young rustics proof against the weather. In a thousand instances the water which town populations command within their houses, the countryman in the village or in the wold can only obtain with uncertainty and toil; his rations are meagre, his walls damp, the refuse-heaps are near his door, 'for as a rule no rubbish is removed, but waits patiently the action of mere natural chemistry;' and shut up many hours of the night with his family, he is deprived even of that which is supposed his inalienable birthright, the pure air, which invests his dwelling and seeks on all sides, but in vain, to be admitted." Scarlatina appeared to be the chief epidemic disease of the quarter.

In Scotland the death-rate was 2·09 per cent.; the average of the summer quarter of the eight previous years 1·81 per cent. Scarlatina, measles, and small-pox, all very prevalent, exaggerated the mortality of the quarter.

Fourth Quarter.—England and Scotland were still unhealthy. The mortality of England was at the rate of 2·236 per cent., the average being 2·294. In Scotland the excess of mortality was great. The death-rate for the quarter was 2·32 per cent., the average of the winter quarter in eight previous years being 204. In England the excess of mortality above the average of the third quarter of 1861 and 1862 extended to every registration division of the kingdom, except west, north, the north-west, and the north and Yorkshire.

In the Registrar-General's report for the quarter a remarkable illustration is given of the influence of sanitary measures upon the health of a population. "In Salisbury, out of a population of 9039 only twenty-four deaths were registered in the quarter. This city was formerly one of the unhealthiest small cities in the kingdom; and in the ten years 1841-50, the mortality was at the rate of 28 in 1000: cholera with diarrhœa was fatal in the epidemic of 1849 to 20 in every 1000 of its inhabitants. Aroused into activity by the approach of the second cholera epidemic, a local board of health was appointed, and proceeded to do its work effectively. The open

drains running through the streets were filled up, a *complete system* of drainage was carried out, and works were established which provide a plentiful supply of water. These municipal reforms, commenced in 1853, were completed in 1854; and the death-toll has been levied with less severity ever since the year 1855. The mortality in the ten years 1851-60 fell to 24 in 1000, and though higher in the first was lower in the last five years of this period. The mortality was at the rate of 27 in 1862, and 15 per 1000 in 1863. The full effects of sanitary improvements only become apparent after some years; and the disturbance of the seeds of disease is sometimes followed by epidemics, as was apparently the case in Salisbury, where the mortality was at the rate of 29 and 27 in 1000 during 1854 and 1855; while in 1856 the mortality fell to 22, and after some fluctuation to 18 in 1860 and 1861. This happy healthy state was disturbed by epidemics of measles and whooping-cough in 1862, when 240 people died from all causes, and the mortality was at the rate of 27 in 1000. In the year 1863 the vigilance of the Board of Health was again rewarded, and the mortality fell to 15 in 1000; thus justifying the sanguine registrar when he says:—

'In my previous report I stated that in my opinion the low rate of mortality was owing to the completeness of the sanitary improvements lately carried into effect, and I attribute the continued favourable state of the public health in this district to the same cause. It is a remarkable fact, that in a population of 9039 the deaths have been only 44 in a half year.'

At the rates still prevailing in other towns the deaths in a half year would have been 113; thus 79 lives were saved. The sick city, healed in his county, is a cheering memorial near the ashes of Lord Herbert, which lie above Salisbury on a tributary of the Avon. But, as experience proves, the health of a city, like the sacred fire on the altar, requires the constant vigilance of its guardians, otherwise its flames expire."

The mortality of the year 1863, in every registrar's division of England, except Wales, was above the average. The Registrar-General attributes this increase of mortality, which, he remarks, is not to be regarded without regret and alarm, as arising chiefly from the prevalence of fever and scarlatina. The prevalence of continued fever, except in the metropolis, to an extent to affect in so serious a manner the mortality returns, is not shown in the returns of the

local registrars. The death-rate for the whole of England was 2·314 per cent.; the average of the previous ten years being 2·211. The mortality of the year 1863 in Scotland is the highest recorded since the Registration Act came into operation. The death-rate for the year was 230 in every 10,000 persons: the death-rate of the eight previous years being only 209. In the town districts the death-rate was 272 in every 10,000 population; in the country, the rate was 183. The excessive increase of mortality is thus accounted for:—"During 1863 there has not been nearly the usual amount of change, variation, or daily and monthly range of temperature. In fact, there has not been a sufficiency of variation of temperature to strengthen the animal constitution against the tendency to debility, caused by the unusual mildness and dampness of the atmosphere. Sudden changes of temperature, as all are aware, are hurtful; but experience of this and former seasons fully demonstrates, that a certain amount of variation of temperature is essential to health. To the circumstance of two years having followed each other when such atmospheric vicissitudes have been smaller than usual, while, at the same time, there has been a greater fall of rain, and more atmospheric humidity, may in great part be attributed the high mortality which has prevailed during every month of the year 1863."

The mortality of London in 1863 was slightly above the average of the preceding twenty-four years. The death-rate was 2·452 per cent., an excess of 0·29 above the year stated. The chief cause of the excess was the zymotic class of the disease, which killed 21,005 persons. The following observations of the Registrar-General on the mortality of London deserve to be noted:—

"If we take the two decenniads, the mortality in the first (1840-9) is at the rate of 25·16, in the second (1850-9) at the rate of 23·63 per 1000 of the population; thus showing a progressive improvement of 1·53 deaths less in 1000 living during the second decenniad. Dividing the twenty years into quinquenniads, the rates of mortality were 24·44, 25·88, 24·17, and 23·08; and in the last four years 23·44.

"The mortality was low (22·49) in 1860, and since then has slowly increased to 24·52. This fact should arouse the vigilance of the Boards of Works, for if they cease to carry out the recommendations of their health officers, the ground gained will be lost, and London will no longer be the healthiest large city in the world.

"It must be borne in mind that the loss of life in London

was formerly much greater in proportion to the population than the loss of life among the English in India; and that its present salubrity is as much the creature of art, imperfect it is true, as the fertility of the soil of Holland, which the sea once covered. If the sanitary dykes be neglected, the three millions of people may again be overwhelmed by cholera, dysentery, and the plague, which are now relegated to the filthy cities of the Mediterranean and of the tropics.

"What London wants is a constant supply of pure water, well-aired dwellings, drainage, and the removal of all the manure to the fields. Grand engineering works sometimes dazzle the understanding, and are accepted as substitutes for substantial efficiency, but they are only of use so far as they discharge these humble but useful functions."

4. THE PREVALENCE OF EPIDEMIC DISEASES.

I proceed now to sum up the facts showing the prevalence of epidemic diseases during the year. The following epidemic affections find the chief place in the reports of the local registrars in accordance with the instructions I have quoted, and they constitute the most prevalent epidemic maladies of the year, viz., scarlatina, small-pox, measles, diphtheria, continued fevers, whooping-cough.

Scarlet Fever.

England.—The prevalence of scarlet fever as an epidemic was reported in England from 61 districts in the first quarter; 75 in the second; 116 in the third; and 121 in the fourth. The distribution of the districts in the different groups of counties was as follows: S.W., 71; N.W., 56; Y., 51; E., 43; W.M., 40; S.M., 27; S.E., 26; N., 25.

The average mortality from scarlatina during the decenniad 1851-60 was 88 in every 100,000 living at all ages; and 419 at less than five years of age. The range of mortality was *at all ages* from 0 in the Scilly Isles to 187 in Bolton, Lancashire; at *less than five years of age*, from 0 in the Scilly Isles to 870 in Liverpool. In 113 of the districts infected epidemically by scarlatina in 1863 the mortality from the disease during 1851-60 was below the average, and in 51 it was above the average.

The Metropolis.—In the metropolis the deaths from scarlet-fever steadily rose from 880 in the first quarter, to 1055 in the second; 1519 in the third; and 1621 in the fourth. The total mortality from the disease in the year was 5075—the largest mortality since the formation of the Registrar-General's department in 1837.

Scotland.—In Scotland the prevalence of scarlet-fever was reported from 21 districts in the first quarter; 14 in the second; 31 in the third; and 48 in the fourth. The distribution of the districts was as follows: S.W., 40; S., 19; E.M., 18; S.E., 13; W.M., 10; N.E., 9; N., 4; N.W., 1.

Scarlatina was the most fatal of the epidemic diseases in the eight towns during the year, causing 1727 deaths, or 6·3 per cent. of the general mortality. Dundee and Glasgow were the two towns where this epidemic chiefly raged; and its fatality was so great in them, that 10·9 per cent. of the deaths in Dundee, and 9 per cent. of the deaths in Glasgow were caused by scarlatina. In all the other towns the mortality from that disease was comparatively low, excepting in Greenock, where the scarlatina deaths amount to 3·3 per cent. of the mortality.

The most prevalent and fatal epidemic disease during 1863, so far as an opinion may be formed from the data at present accessible, was scarlet fever. If the mortality from the disease in London were to be taken as a criterion, the nation suffered in 1863, or is now suffering, from an altogether exceptional outbreak of this deadly malady. The mortality from scarlet-fever in London in 1863 was the greatest which has occurred from the disease, as has been already stated, since the establishment of the present system of registration of deaths. The fatality and prevalence of the malady would appear to increase in the metropolis with the increasing population. The average annual mortality from the disease in the first quinquennium of the period referred to was 1162; in the second, 1868; in the third, 2298; and in the fourth, no less than 3604. The annual average for the whole period was 2260. The periods of unusual activity of the disease, moreover, not only become more frequent but more protracted. The years of excessive mortality were as follows: 1839, 1844, 1848, 1852,53,54, and 1858,59,60,61,62,63. In these years the mortality exceeded the average of the 25 years. The mortality in 1863 was more than double this average.

The returns of deaths from scarlet fever in England generally, include two periods, one of five years, from 1838 to 1842 inclusive; and one of sixteen years, from 1847 to 1862 inclusive. The total number of deaths in the two periods amounted to 310,720; the annual average mortality of the twenty-one years being 14,796. In the first quinquennium of the period (1838-42) the average yearly mortality was 12,582; in the second (1847-51) it was 15,065;

in the third (1852-56), 16,720; and in the fourth (1857-61), 14,089. Or, to institute a more accurate comparison between the different quinquenniums, in the first the average annual mortality per 100,000 population living, at all ages, was 81; in the second, 84; in the third, 129; and in the fourth, 74. The remarkable falling off in the mortality from the fourth quinquennium, was contemporaneous with the naturalisation, so to speak, of diphtheria among the population.

The periods of excessive mortality from scarlet fever in England generally, were 1840, when the death-rate from the disease reached 128 per 100,000 population; 1848, when the death-rate was 118; 1852, when the death-rate was 103; and 1858, when the death-rate was 121. In 1859 the mortality averaged 97 per 100,000 population.

Of the fatality of the outbreak of scarlet fever in 1863, the following illustrations may be quoted:—

	Total Mortality.		Scarlet Fever.	
East Maidstone (Kent)	81	...	26	
Newport (Isle of Wight)	—	...	⅛	total mort.
Basingstoke (Hants)	67	...	23	
Brentford	—	...	¼	„
Oxford	—	...	¼	„
St. Anslett (Grampound)	56	...	29	
Truro (St. Agnes)	74	...	33	
Falmouth	148	...	43	
Penzance	207	...	71	
Bristol	116	...	33	
Clifton	210	...	84	
Burton-upon-Trent	150	...	47	
Tamworth	170	...	74	
Worcester	309	...	131	
Foleshill (Warwick)	99	...	23	
Coventry (Holy Trinity)	114	...	31	
Bath	82	...	25	

Small-pox.

England.—The prevalence of small-pox was reported in England from 37 districts in the first quarter, 76 in the second, 26 in the third, and 27 in the fourth. The distribution of the districts was as follows:—E., 73; N.W., 23; N., 17; E., 14; S.E., 14; S.W., 9; N.M., 9; S.M., 5; W.M., 2.

The average mortality from small-pox at less than five years of age in the decennium 1851-60 was 103 in every 100,000 living. In 56 of the infected districts in 1863, the mortality from small-pox during 1851-60 was less than the average, and in 35 it was in excess of the average. The average of mortality from small-pox among young children is from 0 in many places to 463 in Plymouth.

The Metropolis.—The mortality from small-pox was 422 in the first quarter; 788 in the second; 512 in the third; 290 in the fourth; and in the aggregate 2012—the largest mortality from the disease since 1838.

Scotland.—In Scotland the prevalence or presence of small-pox was reported from 23 districts in the first quarter; 49 in the second, 36 in the third, and 35 in the fourth. The distribution of the districts was as follows:—S., 37; N.E., 27; E.M., 27; W.M., 26; S.W., 13; S.E., 12; N.W., 1; N., 1.

Small-pox cut off 816 persons in the eight towns during the year, and thus constituted 3 per cent. of the total deaths. That disease was so prevalent and fatal in Greenock, that 11 per cent. of the deaths were caused by small-pox; while the proportion was 4·5 per cent. of the deaths in Dundee, and 3 per cent. in Aberdeen. Most of the persons who fell victims to this loathsome disease had never been vaccinated.

If the mortality from the wide-spread prevalence of small-pox in Great Britain prove to be as great in proportion as the deaths from the disease in London, the mortality returns of 1863 will be a humiliating illustration of the incoherencies of British state-medicine. Of the source of the recurrent and wide-spread outbreaks of small-pox in Great Britain—imperfect vaccination—no doubt can exist. The introduction of a consistent compulsory system of public vaccination for Scotland and Ireland dates only from last year. The state of public vaccination in England has been fully laid bare by the recent investigations carried on by Drs. Seaton, Sanderson, Stevens, and Buchanan, under the direction of the Medical Department of the Privy Council. The summaries of these investigations, published in Mr. Simon's fourth and fifth annual reports, "complete," to use the words of that gentleman, "for more than half England and Wales, an elaborate picture of the working of a system which the legislature has designed to be the national protection against small-pox. And from the picture thus given, together with much other information which is before their lordships, the conclusion cannot but be drawn that the intentions of the legislature in this respect are but very imperfectly fulfilled; that the public defences against small-pox are in great part insufficient and delusive. That this most unsatisfactory conclusion will not be countervailed by evidence which may hereafter come from districts hitherto not reported on; that, on the contrary, such future reports may rather strengthen than weaken the grounds on which

the conclusion rests, will be evident when the fact is considered, that in a large and very important share of the districts not yet reported (namely, in the metropolis and in Yorkshire, which are now in course of being inspected) small-pox is at this moment alarmingly epidemic."

Apropos of the recent outbreak of small-pox in the metropolis, I would quote the following pertinent observation from Dr. Seaton's Report to the Privy Council on the Epidemic of Small-pox in London in 1859, and the means taken for its control:—"It is probable," he says, "that when the measures herein related were completed, the proportion of vaccinated in the districts of London to which this report refers was larger than it had ever before been. But now that the alarm of small-pox has passed away, it is certain that people will relapse into old habits of indifference and neglect, and that without constant vigilance, a re-accumulation of susceptible persons will take place, and go on till it shall attain the amount which will admit of another of those epidemic visitations from which London is never free for more than two years together."*

The foresight of Dr. Seaton has been fully confirmed by subsequent events, and his observations may be probably as truthfully applied to the outbreak of 1863 as of 1859. Now that the brunt of the recent epidemic has apparently passed, government and the people are becoming indifferent to the question of vaccination. The Council proposes in the name of the Society to memorialise the government on the subject; and it trusts that its efforts may prove as useful as when the Society memorialised the government on the same subject in 1853.

Measles.

England.—The prevalence of measles was reported from 32 registration districts in the first quarter; 37 in the second; 11 in the third; and 20 in the fourth. The disease appears to have been most prevalent in the south-western (29 districts) and north-western counties (19).

The average mortality from measles in England during the decennium 1851-60 was 280 in every 100,000 persons living at less than five years of age. In 46 of the localities reported to be infected by measles in 1863 the mortality of the disease during the decennium referred to was less than the average of the kingdom; in two the mortality was equal to the average; and in 24 the mortality was above the average.

The Metropolis.—The mortality from measles in the me-

* Third Report of Medical Officer of Privy Council, p. 59.

tropolis in the first quarter of 1863 was 576; in the second, 606; in the third, 221; and in the fourth, 295. The total mortality from the disease was 1698. In 1862 the mortality was 2281; in 1858 it was 2383.

Scotland.—The prevalence of measles was reported from 41 districts in the first quarter; 48 in the second; 21 in the third; and 14 in the fourth. The disease was most prevalent in the first six months of the year in the east midland (29), south-western (26), southern (23), and north-eastern (21) counties.

Measles proved fatal to 998 persons in the eight towns, and thus constituted 3·6 per cent. of the total deaths. Leith and Edinburgh were the only towns where this proportion was exceeded; for 7·5 per cent. of the deaths in Leith, and 4·3 per cent. of those in Edinburgh were attributed to measles. "The fact of measles of a fatal type often following epidemics of small-pox," says the Scottish Registrar-General, "has been several times noticed in these reports, and Leith and Edinburgh during the past year afford another example of the close relation which exists in this respect between these two diseases. It may be remembered that, in 1862, Leith and Edinburgh were visited by a severe epidemic of small-pox; but that epidemic proved twice as fatal in Leith as in Edinburgh. These are the two towns in which measles has been most fatal in 1863, and that fatality has been almost in the same proportion as the previous epidemic of small-pox."

Continued Fevers.

England.—The prevalence of continued fever was reported in England in 9 districts in the first quarter; 1 in the second; 8 in the third; and 8 in the fourth. The distribution of these infected districts was as follows:—S.M., 8; E., 6; N.W., 5; S.E., 2; S.M., 2; N., 2; E., 1; S.W., 0; W.M., 0; N.M., 0.

The average mortality from continued fever at all ages during the decennium 1851-60 was 91 in every 100,000 living. In 16 of the infected districts in 1862 the mortality from this cause in 1851-60 was above the average of the kingdom, in 13 it was below the average.

The Metropolis.—The mortality from continued fevers was 785 in the first quarter; 624 in the second; 652 in the third; and 881 in the fourth. In the corresponding quarters of 1862 the mortality had been 991, 1015, 883, and 796. The total mortality from this cause in 1863 was 2892; in

1862, 3635; and in 1861, 1754. In my last report I quoted Dr. Murchison's account of the remarkable outbreak of typhus in 1862, to which the largely increased mortality of continued fevers in the metropolis during that year was due. The history of the epidemic in 1863 is best quoted from the account drawn up by Dr. Murchison for last year's Report of the London Fever Hospital.

"As in former years, typhus fever has been the disease upon the prevalence of which the varying number of admissions during 1863 has mainly depended. The small number of admissions into the hospital in the year 1858-61, and the unprecedented numbers in the two last years, have been due to the almost complete absence of typhus in the former case, and to its great prevalence in the latter. In the year 1858, the number of patients admitted with typhus was 15, and during seven months, only one case was observed; but in the years 1862 and 1863, the typhus admissions numbered 1827 and 1319. The epidemic of typhus which commenced in December 1861, and raged throughout 1862, still continues. In the summer of 1863, it subsided to such an extent as to lead one to hope that it was about to pass away, but late in the autumn it again rapidly increased. The typhus admissions which in January were 123, fell in June to 43, but rose in November to 244. In the last mentioned month also, a considerable number of typhus patients were refused admission for want of room. The epidemic is still confined to the poorest class of the population. A very large proportion of the patients suffering from typhus, admitted during last year, had been out of employment and in a very destitute state for a considerable time prior to their attack. Many of them had only come to London, from different parts of the country, in search of work, shortly before their illness. There was no evidence, however, that they had imported the fever into London. Of the 1319 cases, only 35 were natives of Ireland; all but four of the 35 had resided in London more than three months before their illness, and none were taken ill before their arrival. At the commencement of the epidemic there was a great preponderance of male over female typhus patients. Thus, up to the end of June 1862, there were 669 males to 461 females; but since then the proportion has been reversed, and during the year 1863, 581 males and 738 females were admitted. The localities of the metropolis, whence the typhus patients were derived, were the poorest and most densely crowded. Thus, of the 56 districts into which London is divided, Bermond-

sey furnishes 160 cases; Lambeth, 159; St. George's-in-the-East, 140; Rotherhithe, 94; the poorer parts of Marylebone, 78; City of London, 60; St. Pancras, 54; and Greenwich, 51. On the other hand, Hampstead supplied only one case, and St. George's, Hanover Square, none, although examples of other forms of fever were derived from both of these parishes. The great increase of typhus towards the end of the year was most marked in the southern and eastern divisions of the metropolis. Thus, of 605 typhus patients, admitted during the last three months of the year, 440 were brought from these two divisions, and no fewer than 275 from the three parishes of Lambeth, Bermondsey, and Rotherhithe.

"No instance of relapsing fever has been observed at the hospital during the present epidemic. Indeed, no patient suffering from this fever has been admitted since 1854.

"Enteric or pythogenic fever has constituted no part of the present epidemic."

Scotland.—In Scotland the prevalence of continued fever was reported from 16 districts in the first quarter; 13 in the second; 11 in the third; and 24 in the fourth. The distribution of these districts was as follows:—N.E., 16; S.W., 12; S., 11; S.E., 8; E.M., 7; N., 7; W.M., 2; N.M., 1.

"Typhus in its varied forms of gastric, typhoid, typhous, and infantile fever, was the second most fatal of the epidemics, cutting off 1398 persons in the eight towns during the year, thus constituting the high proportion of 5·1 per cent. of the general mortality. This proportion was exceeded in Leith, Aberdeen, Perth, and Greenock—the relative proportions being 9·7 per cent. of the deaths in Leith; 7·3 per cent. in Aberdeen; 6·1 per cent. in Perth; and 5·2 per cent. in Greenock. In Glasgow the proportion was 5·1 per cent. of the deaths; while in Edinburgh, Dundee, and Paisley only 4·2 per cent. of the deaths were attributed to that cause. Nowhere, strictly speaking, can the disease be said to have appeared as an epidemic."

Diphtheria.

England.—The prevalence of diphtheria was reported from 7 districts in England in the first quarter; 7 in the second; 10 in the third; and 23 in the fourth. The distribution of these districts was as follows:—E., 13; S.M., 7; Y., 7; S.E., 4; N.W., 3; W.M., 2; M. and Wales, 1.

The average mortality from diphtheria at all ages during the decennium 1851-61 was 11 in every 100,000 living,

The range of mortality was from 0 in the Scilly Isles to 310 in Howden, Yorkshire. In 15 of the infected districts in 1863 the mortality from the disease in the 10 years referred to was above the average; in 21 it was below; and in 1 it was equal to the average.

The Metropolis.—The mortality from diphtheria (724) was somewhat less than in 1862 (734), but greater than in 1861 (697). The deaths from the disease in the first quarter, were 178; second quarter, 175; third quarter, 192; and fourth quarter, 179.

Scotland.—In Scotland the prevalence of diphtheria was reported from 28 districts in the first quarter; 18 in the second; 26 in the third; and 32 in the fourth. The distribution of the districts was as follows:—E.M., 45; N.E., 20; W.M., 11; S.W., 8; S.E., 6; N., 6; S., 5; and N.W., 3.

Diphtheria still continues to increase. In 1861 the deaths from diphtheria in the eight towns numbered 151, in 1862 they had increased to 285; but during 1863 they amounted to 478, and thus constituted 1·7 per cent. of the general mortality. This disease was proportionally most fatal in Leith, next in Aberdeen, and then in Edinburgh; 2·7 per cent. of all the deaths in Leith, 2·4 per cent. in Aberdeen, and 2·3 per cent. in Edinburgh were attributed to diphtheria.

In both countries, diphtheria prevailed alone or in conjunction with other epidemic diseases, as follows:—

	Districts.
Diphtheria alone	57
„ with scarlatina	34
„ with small-pox	9
„ with measles	7
„ with fever	5
„ with sore-throat	3
„ with croup	3
„ with catarrh	3
„ with whooping-cough	1
„ with measles and croup	1

Sore Throat.

Scotland.—The prevalence of sore throat was recorded in 9 Scottish districts in the first quarter; 2 in the second; 1 in the third; and 4 in the fourth. The distribution of the districts was as follows:—E.M., 6; N.E., 5; N., 2; N.W., 2; S.E., 1.

Whooping Cough.

The prevalence of whooping cough was reported from 7 districts in *England* in the first quarter (S.W., 5; E.C., 1;

S.E., 1); and 1 (E.) in the third quarter. In the *Metropolis* whooping cough was more fatal in 1863 (2229) than in 1862 (2150), but less fatal than in 1861 (3497). In *Scotland* the disease was reported as prevalent in 8 districts in the third quarter (E.M., 5; S.W., 2; W.M., 1); and 7 in the fourth quarter (S.W., 3; E.M., 3; W.M., 1).

"Whooping cough," says the Scottish Registrar-General, "is generally the most fatal disease of childhood; but in 1863 only 976 deaths, or 3·6 per cent. of the mortality, were attributed to that cause. In Greenock, however, whooping cough was very fatal, the deaths therefrom constituting 7.6 per cent. of the mortality; while in Glasgow, the next town in which it was most fatal, 4·5 per cent. of the deaths were caused by that disease."

Diarrhœa.

Diarrhœa was reported as prevalent in *England* in 27 districts in the third quarter (N.W., 10; E., 9; N., 2; W.M., 2; S.E., 1; S.M., 1; E., 1; S.W., 1). In the *Metropolis* the mortality from diarrhœa was greater in 1863 (2448) than in 1862 (1735), but less than in 1861 (2625). In *Scotland* the disease was reported as prevalent in one district of the northern counties in the first quarter; and one district of the N.W. counties in the second quarter.

Croup.

Four local outbreaks of croup are recorded in the Scottish returns—1 in the N. counties (second quarter); 1 in the E.M.; 1 in the W.M.; and 1 in the S.W. counties in the fourth quarter. Croup cut off 640 children in the eight chief towns, and thus constituted 2·3 per cent. of the deaths. In the *Metropolis* the mortality from croup in 1862 was greater than it had been from that disease since the commencement of the present system of registration in 1837. In 1863 there was a slight diminution of the mortality from the disease, the deaths numbering 927.

REMARKS ON THE ENTHETIC DISEASES AFFECTING THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM

FOR THE YEARS 1837-46, 1859, 1860, AND 1861.

By Dr. FRANCIS BOWEN.

[*Read June* 6, 1864.]

STATISTICS, however valueless they may prove in solving some questions, cannot be gainsaid as to the matters of fact contained in the medical, sanitary, and statistical reports of the Army Medical Department for the years 1859, 1860, and 1861, connected with those diseases of a special type which are the bane of the British soldier.

Public attention has of late been frequently drawn to the unsavoury discussion of syphilis in the army and navy, and many suggestions have been thrown out, from time to time, in the daily papers and the medical journals, for enforcing such measures as might tend to limit the prevalence of so highly contagious a disease; and this report has been brought forward rather in the expectation of furnishing a topic for profitable discussion, than from any hope of conveying to this Society anything original. Indeed the nature of the paper only admits of novelty in very limited degree.

It may be taken as a mark of a wholesome change in our way of looking at things, no less than an indication of the magnitude which the evils have attained, that at the 118th anniversary festival of the Lock Hospital, held at Willis's Rooms on the 16th of March of the present year, the Duke of Somerset on the part of the navy, and H.R.H. the Commander-in-Chief, and the Secretary of State for War on the part of the army, pledged the Government to a serious consideration of the matter. Sir John Pakington, who was also present, expressed himself strongly in favour of legislative interference.

"From the day when this loathsome disease was first

* Medical Times and Gazette, 29th August, 1863.

noticed to the present, it has always haunted the camp and barrack. Prevalent as it is in private life, it excites but little notice. Silence is ensured by that popular kind of delicacy which lies in ignoring evils and refusing remedies, lest those evils should seem even indirectly to be sanctioned, or lest public morality should suffer by their discussion. But as regards syphilis in the camp, it is money annually lost to the state; and the interests of the tax-payer may compel a notice which could not be extorted on grounds of mere humanity or morals."* This will be shown when we come to details of the great loss of strength caused by venereal disease in the army; the number of men whom it consigns to the hospital; and the havoc which it makes of health and strength for weeks or months, or even for life, in men who recover.

The accompanying table gives a comparative view of the admissions, deaths, and invaliding per 1000 of mean strength by these diseases among the troops serving in the United Kingdom for the years 1837-46, 1859, 1860 and 1861; and I shall give Dr. Balfour's own words in remarking upon these diseases. "Enthetic diseases, which comprise all the forms of venereal disease, have been the cause of much more inefficiency than any other class in all arms of the service except the Household Cavalry, and show a marked increase in their prevalence compared with the previous average, as will be seen by the following statement:—

	Annual Ratio per 1000.	
	1859.	1837-46.
Household Cavalry	120·4	...
Dragoon Guards and Dragoons	402·5	206·1
Royal Artillery	571·4	392·0
Royal Engineers	468·2	...
Military Train	580·3	...
Foot Guards	337·0	250·3
Infantry Regiments	399·4	277·5
Depôt Battalions	399·8	...

Thus it appears that the increase of venereal has varied from one-fourth to half of the former average, except in the Household Cavalry, it has given rise to not much under one-half of the admissions into hospital, and, as the cause of so great an amount of inefficiency, deserves the serious consi-

* Medical Times and Gazette, 29th August, 1863.
† Annual Report, Army Medical Department, 1859, pages 14-15.

deration of the military authorities. In 1859 there were 422 admissions into hospital on account of venereal among every 1000 men serving in the United Kingdom. From data which will be available for publication in the next Annual Report, the duration of cases of this class has been found to average 23·22 days. Assuming the mean strength of troops in the United Kingdom to be 90,000, the inefficiency, arising from venereal alone, must therefore be equal to the loss of the services, for the whole year, of 2,417 men, or of nearly three regiments. Not only, however, is the subject important from the loss of the services of these men, but many of the diseases included in the class are likely to impair the constitution, and, although not an immediate cause of death, to give rise to pulmonary consumption and other fatal diseases, or disqualify the men permanently for military service.'

"No satisfactory reason can be assigned for the much greater prevalence of this class of diseases among the men of the Ordnance Corps and Military Train than the other troops. It may, perhaps, arise from the large proportion of them quartered at Woolwich, which appears, by the returns of the former period, to have enjoyed an unenviable pre-eminence in this respect. We hope in a future report to be able to show conclusively the stations at which these diseases have been most frequent. The returns for 1859 do not furnish the information necessary for the careful examination of this point. It may, however, be stated, that at Aldershot the admissions appear to have slightly exceeded the average, having amounted to 433 per 1000 of strength; among the troops quartered in Ireland, on the contrary, the ratio was considerably under the average, being only 357 per 1000.

"If the diseases of this class be subdivided into two groups, the first consisting of gonorrhœa, swelled testicle, and stricture of the urethra, and the second of primary and secondary syphilis, venereal sores and buboes, they will be found distributed in the following proportions:—

Annual Ratio per 1000 Admitted.	Household Cavalry.	Dragoon Gds. & Dragoons.	Royal Artillery.	Royal Engineers.	Military Train.	Foot Guards.	Infantry Regiments.	Depôt Battalions.
Gonorrhœal ...	45	142	219	226	138	84	152	201
Syphilitic	75	260	352	242	442	254	247	199

The diseases comprised in the syphilitic group are more likely to affect the general health and impair the constitution than those in the gonorrhœal. When, therefore, the admissions by it are found to equal in number one-fourth of the whole force, it surely becomes a question of grave importance by what means these diseases can be diminished."*

I shall now proceed to a comparison of the amount of enthetic disease in all branches of the service for the year 1860, with that of 1859.

This class of disease, comprising all the forms of venereal, has been the cause of less inefficiency in all branches of the service than during 1859, as will be seen by the following table:—

	Ratio of Admissions per 1000 of Mean Strength.	
	In 1860.	In 1859.
Household Cavalry	119	120
Dragoon Guards and Dragoons	356	402
Royal Artillery	446	571
Royal Engineers	324	468
Military Train	427	580
Foot Guards	287	338
Infantry Regiments	324	399
Cavalry Depôts	353	...
Depôt Brigade	511	...
Depôt Battalions	312	400

Thus, with the exception of the Household Cavalry, which remains at its former low average, there has been a marked decrease in the prevalence of venereal in all classes of troops. In the Royal Artillery the reduction, as shown in this table, is over-stated, as the Depôt Brigade was included with the other brigades, and only that portion of the force serving in Great Britain furnished returns last year. The very high ratio in the Depôt Brigade may probably be owing to the large proportion of recruits passing through it, and to its being quartered at Woolwich, which still maintains its notoriety for the extent of venereal among the troops.

The proportion of married men in the different arms must undoubtedly exert a great influence on the amount of venereal, but unfortunately there are no means of forming a correct estimate on this point. There would be no difficulty in obtaining a return of the men married "with leave," but this would only lead to error. In the Household Cavalry

* Annual Report, 1860, pages 11-22.

and Foot Guards especially, which are less frequently moved than troops of the Line, and are only sent abroad on an emergency, there is reason to suppose that the number of men married without leave is considerable; and it is probably to this circumstance that the comparatively low ratio of venereal in them is attributable.

Grouping the diseases of this class into gonorrhœal and syphilitic, in the same manner as in last report, we obtain the following results:—

Annual Ratio per 1000 Admitted.	Household Cavalry.	Dragoon Gds. & Dragoons.	Royal Artillery.	Royal Engineers.	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôts.	Depôt Brigade Rl. Artillery.	Depôt Battalions.
Gonorrhœal	39·3	129·6	167·8	148·7	136·4	72·2	129·1	157·9	217·1	162·6
Syphilitic ...	79·3	226·7	275·9	175·8	290·9	215·1	194·6	195·5	294·1	149·6

On comparing these results with the table given in the report for last year, it will be found that in the Military Train the reduction in the admissions has been entirely in the syphilitic group; among the other troops it has taken place in both groups, but, except the Artillery, to a greater extent in the syphilitic than the gonorrhœal. The comparatively low rate of admissions by gonorrhœa in the Foot Guards would lead to the suspicion that the men are in the habit of concealing the disease, and getting themselves treated by civilians, to avoid being placed under hospital stoppages.

The invaliding for enthetic disease has only amounted to ·69 per 1000 of the force; but although the proportion is so small, there can be no doubt that many of the men discharged with broken health and for rheumatism could with justice trace the origin of their disabilities to them.

I now take up the annual report for 1861 (the latest issued):—

"The admissions on account of venereal diseases continue very high, exceeding in number one-third of the strength. There has been a slight increase in the proportion in the seaport towns, camps, and at London and Windsor, and a decrease in all the other groups of stations, but particularly at Dublin, the dockyards, and arsenals, and the 'remaining stations.'"

The following table shows the admissions per 1000 of mean

* Annual Report, 1861, pages 11 and 18.

strength by these diseases at each of the large stations, compared with the results of 1860:—

	1861.	1860.		1861.	1860.
Manchester	487	289	Limerick	360	401
Portsmouth	485	503	Cork	354	346
Plymouth and Devonport	470	440	Chatham and Sheerness...	328	351
Belfast	469	413	Shorncliffe	325	327
Colchester	415	430	Birr	309	268
Dover	401	383	Parkhurst, Isle of Wight	295	304
Woolwich	399	473	Pembroke Dock	261	228
Canterbury	397	290	Edinburgh	260	300
Winchester	380	408	Preston	209	411
The Curragh	364	373	Fermoy	195	268
Dublin	363	409	London & Household. Cav.	135	97
Aldershot	361	339	Windsor Foot Guards...	328	255

The admissions into hospital by this class of disease have amounted to 354 per 1000 of the strength. The number constantly in hospital with them has been 23·45 per 1000, and the average duration of the cases 24·19 days. The inefficiency caused by it has therefore been equal to the loss of the services of every soldier at home for 8·56 days, being a trifle under the amount in the preceding.

On dividing the venereal diseases into two groups, syphilitic and gonorrhœal, the following results are obtained as to the relative prevalence and duration:—

	Ratio per 1000.		Average Duration of Cases.
	Admitted.	Constantly Sick.	
Syphilitic	209·8	15·95	27·81 days.
Gonorrhœal	144.	7·50	19· „

Taking the principal diseases in each of these two groups separately, the average period in hospital is found to be—of primary syphilis, 25·70 days; of secondary, 27·73 days; of gonorrhœa, 18·77 days; of swelled testicle, 17·80 days; and of stricture of the urethra, 29·90 days.

Except in the Household Cavalry and Foot Guards, in which the admissions slightly exceed the ratio in 1860, these diseases have been less prevalent in all the arms. The invaliding on account of venereal has been 1·85 per 1000 of the strength.

A glance at these annual reports are sufficient to give one an idea of the scientific value and practical utility of the labours of the Medical Staff in many distant lands, and on

many trying occasions. These reports, with the excellent and interesting papers which accompany them, increase in value every year, and a classification of all the observations of the year is reported in the nosological form adopted by the registrar-general.

In a work recently published by Dr. Grant, late of the Bengal Medical Service, under the title of *Annals of Military and Naval Surgery and Tropical Medicine and Hygiene*,* a vast proportion of the articles he has so well selected, abridged, and arranged, are contributions by the Medical Staff of the army and navy, and the *Lancet* of the 4th of this month in noticing this book, states, "Taken as a whole, the articles in this compilation reflect the highest credit on the zeal and ability of the officers on whose unworthy treatment by the authorities it has so often of late been our imperative duty to comment. We say it is in the highest degree creditable to the medical officers of the army and navy, at home and abroad, that in the face of so many discouragements they have been true to their duty, and considering themselves 'debtors to their profession,' have done so much to advance it."†

From these annals and the reports of the year, especially, are gleaned the following various points commented on at different stations:—

In Portsmouth, Surgeon Perry, of the Royal Artillery, adverts emphatically to the prevalence of venereal diseases there, and bears testimony to the benefit and advantage of the legislative enactment at Malta in contrast of results. He writes, "Medical officers are unable to grapple with the evil unless police authorities aid in restriction upon the source whence it is derived; the only means whereby a great and really terrible evil may be lessened, if not abolished, and a better state of public health become the result. Vice is not legalised by its effects being carefully watched and checked; and hence, if the vocation is well known, the mischief arising from such a calling should be under police control as much as any nuisance affecting the public health."

Surgeon Franklin, of the 10th Foot, in a communication to the *Times*, says,

Professor Maclean, in his introductory lecture at the Royal Victoria Hospital, Netley, states that the ills which arise from the diseases in question, rendering the soldier prema-

* Annals of Military and Naval Surgery, by Dr. Grant, vol. i.
† Lancet, 4th June, 1864.

turely old and inefficient, amount to 50 per cent. In judging of the health of troops, the following points must be considered, viz., length of service, length of tropical service, age of the man, whether married or single. Among British soldiers, as age increases, so the mortality, in comparison with the civil population, increases to an immense degree; and almost all the rheumatism and, in fact, many other diseases are traceable to the soldier having been the victim of that class of diseases of which I speak. If not, how is it that this is not the case in continental armies, as the French, Prussian, and Austrian; and why is it that in the Danish and Hanoverian armies the case is reversed, and the soldier, as age advances, becomes absolutely more healthy than the civil population? In the English infantry the average number of sick is about 50 per 1000 men; in the English cavalry a little less; in the Royal Artillery, a little more; and the Military Train and Depôt Battalions, at most 7000 men, furnish about 1400 admissions per annum, on account of these two corps being chiefly composed of old and young soldiers. Striking an average in the British army, the number of sick is nearly 55 per 1000 of strength; in the French army, 45; in the Prussian, 47; and in the Austrian, 48. Our average time in hospital is seventeen to twenty or twenty-one days; in the French army it is sixteen days; in the Prussian army it is sixteen days; and in the Austrian army it is seventeen days. But the special diseases which constitute the chief admissions in our army keep men a long time under treatment; and this serves to explain why they are longer in hospital than is the case on the Continent. These diseases in the English army run up the admissions to from 350 to 450 per annum, or nearly one-half, of which one-third are of lighter and two-thirds of the severer kind. The French army is very fortunate in this respect. Taking the garrison of Paris and comparing it with some of ours, we find the admissions from these diseases were:—In 1858, Paris, 24 per 1000 men; Aldershot, 411 per 1000 men; Woolwich, 512 per 1000 men.

Sometimes in Paris it fell to 16 per 1000 men; while in England it was twenty times as great; and in the worst garrison, viz., Marseilles, it never reached above 113, or considerably less than one-third of our number, even at Aldershot. There is reason to believe that if it were possible to carry out police regulations, establish special hospitals in our garrison towns, and occupy the men more with their respective trades, that an immense saving in men and money

would be the result; and that in the event of a war we should have a fine, healthy, serviceable body of men, instead of the wretched, ill-formed boys who fill up our regiments after a little drain has taken place; boys who, if they enter at eighteen, have really many years to wait before they become completely formed and able-bodied men.

Mr. David Milroy, of the 30th Regiment, in his observations on pulmonary diseases and their relation to syphilis, states, "Some time has elapsed since the attention of the medical profession and the public was called to the alarming loss for many years sustained by the army from the ravages of pulmonary consumption. Various causes were then assigned to account for the prevalence of this malady, of which over-crowding in barrack-rooms, night duty, and want of variety in diet, appear to have been the most favoured. But although it was known that while phthisis thinned the ranks by death and invaliding, a most important deduction from the available strength of the army was occasioned by the number of men constantly under treatment for venereal complaints, little importance was attached to what was regarded as a mere coincidence. In the minutes of the evidence taken by the commission appointed to inquire into the sanitary condition of the army, there is, however, a statement by Dr. Balfour, Deputy-Inspector-General of Hospitals, which shows that this officer's attention had been directed to the subject. "I think," he says, "that another great cause of pulmonary disease among the Guards is the amount of syphilis, which I have not the least doubt, in men who have any predisposition to tubercular disease, is a very fertile cause of its being called into active operation."

Professor H. Aitken, of the Army Medical School, after some preliminary remarks bearing on pulmonary lesions associated with syphilis, which I would give in full would time admit of it, stated that phthisis must be regarded in many cases as the product of syphilis; that he fully indorsed the statement of Dr. Balfour, from what he had seen in the *post mortem* rooms, that a great cause of pulmonary disease among the Guards was the amount of syphilis, which he had not the least doubt was a very fertile cause of its being called into active operation.

Dr. Jeffery Marston, of the Royal Artillery, makes the following very sensible remarks on the prevalence of the disease. "So long as the public will not entertain any plan of legislative enactment with the view of controlling the spread of syphilis, it would be futile to dwell upon the im-

portance of sanitary measures directed to the examination and removal of affected women."

In large towns, indeed, it would be difficult to carry out efficiently any measure to this end; but it is not so within the limited area of smaller garrison towns, particularly abroad. The experience obtained in Belgium and elsewhere of the control and diminution of syphilitic disease by these measures is quite parallel with my own observations. In Malta and Gibraltar, where measures were stringently enforced, there was almost entire immunity from syphilitic disease amid the troops; and when, as in the former station, these sanitary measures were discontinued, disease became so quickly and widely prevalent as to necessitate a recurrence to them.

Looking to the immense amount of disease and want entailed by these disorders, the great expense incurred by the government from their widely-spread prevalence among troops, and the subsequent loss of health and strength, as well as the congenital or inherited disease to be traced to these causes, it seems wonderful that so little should be done to prevent their spread, and that the desire should be so determined to ignore their existence.

The number of hospitals and means in Great Britain for the treatment of so highly contagious a disease is very small and quite inadequate.

Persons out of the army can form but little idea of the amount of disease and the modifications of health induced by syphilis.

The limits within which any suggestions can be offered are practically narrowed to such as can affect the soldier. Military hospitals in Britain, at any rate, would be comparatively empty were it not for diseases of this kind. As at present, the liberty of the subject is carried to its furthest extent, and made to press unfairly upon the more steady soldier. In all benefit clubs it is a recognised custom that no member shall obtain any advantages for diseases of his own producing and within his own control. In the army it might surely be regarded as a breach of contract when a soldier escapes his duties by his own immoralities. A soldier whilst in hospital with such a disease pays no more than another suffering from one the direct result of the execution of his duties. Moreover, for every day so spent duties are escaped, which fall upon the other and effective men, upon whom therefore, practically, the burden falls. It often happens also that a soldier, by means of such diseases, is ena-

bled to escape some punishment awarded to him at a date prior to the appearance of it. These facts seem to carry with them their own remedies.

It would be utopian to suppose that we shall be able to eradicate diseases of this nature by any efforts directed to the education and amusement of the soldier. No doubt the practical workers in sanitary science have done much, and much more remains to be done; but we must not forget that diseases resulting from immoralities are common enough among persons as far removed from the soldier in these respects as possible. If not so common, obviously, the one class possess means by which they can more easily guard against and escape these evils than can the other.

It is well that those who expect so much from the education and elevation of the soldier, should remember that the life of a soldier is altogether peculiar, viz., he enters the army as a very young man, and is not an old one when he leaves it. During this period of life the passions are not by any means at their weakest. The life of a soldier is a non-natural one of celibacy. It would be incompatible with the nature of his occupation for the soldier to be married, even were it practicable to find sufficient barrack accommodation. Every one will perceive that such a state of things must entail a good deal of immorality.

The married soldiers, however much they may encumber a regiment upon the march, or in barracks, do not swell the list of occupants of military hospitals and prisons.

A soldier's life contrasts with that of a civilian at the very commencement. The "raw material" of our army is composed, in some part, of men unfitted for occupation requiring steady habits and perseverance—if not worse; and the discipline of the army exerts a great influence on the removal and repression of much of the crime which would otherwise elsewhere occur. The plan of enlistment is too often a scandal. The system of barrack life is such that a man is contaminated by the evils around him; it almost necessarily entails a loss of modesty; and individuals obtain that kind of mutual support and sympathy from the conduct of others to which we can find no parallel in civil life.

It has been shown that the larger garrison towns and seaports are the main foci of these syphilitic diseases, and so long as there exist no means for the reception and treatment of persons of both sexes suffering from them, we are neglecting a very obvious way of limiting their ravages. The establishment of such hospitals—or wards in connection with

them—has the decided advantage of applying a measure which will not wound the sensibilities or run counter to the prejudices entertained by the nation against the public recognition of the causes of these evils.

I cannot help calling your attention to the marked difference between the health of our army and that of the armies of France, Prussia, and other foreign countries; it is very startling, and should touch the consciences of our governing body, for it is a proof that we are affected in the pocket more than they.

In conclusion, I have to express the hope that the reiteration of these valuable facts may call forth from those gentlemen who have honoured us with their presence to-night some expression of their views on a subject of such practical importance affecting to so great a degree the health of the British army. There is little doubt that this subject will come before Parliament, now that the authorities have really taken the matter up. It is true "the application of remedies is unquestionably beset with difficulties; practical men must, however, deal with practical evils, and with a little energy these may be greatly alleviated. There is no doubt that any measure of legislative interference having these objects in view which the government may think advisable to introduce, will meet with the general assent of the nation. Prevention of disease and suffering in whatever forms they present is a paramount duty, and cannot be in opposition to the dictates of religion or morality."*

* Medical Times and Gazette, 26th March, 1864.

ON THE PREVENTION OF SYPHILIS IN THE NAVY.

By Dr. DICKSON, R.N.,
MEDICAL INSPECTOR OF CUSTOMS.

[*Read June 6th*, 1864.]

It is not without diffidence that I venture to submit to the Society some remarks on a subject which has recently attracted an unusual, but not an undue, amount of attention.

The relation which venereal diseases bear, or rather ought to bear, to State medicine, and the extent and nature of State supervision, are questions of increasing importance. They have always excited a strong interest in the minds of medical men, and more especially of those connected with the public service. And to some degree this interest has been shared by many wise and thoughtful men out of the profession. But until lately it has been the custom to suppress the truth, and practically to ignore the subject, as unfit for public discussion.

Great merit is therefore due to those enlightened members of the legislature who have not flinched from opening out so unwelcome a theme. They have aroused the attention of the country, and have effectually directed the notice of the government to the havoc which this class of preventible diseases has been permitted, for so many generations, to make on the health of our soldiers and seamen. There is at least a ray of hope pointing to legislative interference and to some well-devised effort to remedy the most crying evil of our time, and to alleviate one of the greatest of human miseries.

A long period of peace and greater facilities of travelling have rendered almost all educated Englishmen more or less familiar with the institutions of our continental neighbours. They could not fail to be struck with the admirable sanitary regulations that were in force in many of the great cities of Europe, and with the paternal care which the various governments bestowed upon even the most vicious and unworthy of their subjects. In some of our colonies and possessions, and chiefly in those where the people are of foreign

race, and the local executive is less fettered by constitutional usages, similar laws were introduced, and with great benefit to the physical health of the community.

The medical officers of our army and navy, whose lot it often is to sojourn in these settlements, had frequent opportunities of testing the efficiency of such enactments for controlling disease among the men under their charge. They could draw comparisons, not always to the advantage of their own country. For it is notorious that, notwithstanding our vast progress in material civilisation, the different forms of venereal disease are as rife, if not as destructive, and infest all classes of society to as great a degree as in any former period of our history.

In some instances the hygienic arrangements that experience had found effectual abroad could not bear transplanting. Our dense population and its habits of locomotion would render nugatory all attempts at a general surveillance. The difference in manners and notions of propriety is too decided, and, above all, the love of that personal freedom which all enjoy in England is too strong to be easily or soon subdued. The obstacles to the adoption and naturalisation of a "*thorough*" system of medical police would seem to be, for the present at least, insuperable. Yet some modification of these restrictions, adapted to our insular ideas, might be practicable; and any check, however slight, to the rank growth and propagation of so dire a poison must be desirable.

It is curious to note the differences that obtain in the sanitary administration of various localities and to mark their results. Information on such points may occasionally be instructive or suggestive. Viewed in this light, any contribution to our stock of knowledge, however humble, may be acceptable, provided it be based on practical experience, and does not seek to prove too much. I purpose, therefore, without further apology, to lay before you a short account of a formidable outbreak of venereal disease which came under my immediate observation, when staff surgeon of the fleet in China, a few years ago. This outbreak was formidable rather from the number than from any pathological peculiarity of the cases, and was more especially remarkable from the circumstance, that at the time and place these diseases were contracted, a sanitary police existed, well-organised, fairly paid, and honestly administered,—as effective, in short, as we could hope to find in any large seaport town. I shall confine my remarks to the vessel which was directly in

my charge, and of the medical details of which I had complete cognisance. I shall premise with a brief history of the ship in relation to this class of diseases throughout her commission, touching but lightly on such circumstances as are necessary to elucidate the narrative, but which bear only indirectly on the present subject.

The "Chesapeake," a steam-frigate of fifty guns, with a crew averaging 550 men, was commissioned at Chatham in the summer of 1857. The news of the great Indian mutiny had just reached England, and she was ordered to proceed immediately to Calcutta. In an extraordinary emergency like this there is never any lack of volunteers, and an excellent ship's company was soon gathered together—young able-bodied men, full of alacrity and spirit—the finest body of seamen I had seen for many years. In such a crew, collected at the various home ports, the surgeon expects to find a considerable proportion of venereal cases. All the men were carefully examined before being entered (300 by myself); but unless there was some untoward complication or the health of the individual was otherwise impaired, no objection was made to admitting or retaining persons affected with this disease. We should otherwise have deprived ourselves of the services of some of our most valuable and efficient seamen, men who had been trained to their duties for many years at great expense to the country. Sixty-four men presented themselves either before leaving England or soon after, suffering from various forms of venereal; but only two had to be left behind at hospital. Before the ship arrived at the Cape of Good Hope all had recovered satisfactorily; and on our arrival on our own—the Indian station—the crew was quite free from any traces of sexual disease.

At Calcutta and Madras, and in Ceylon, they had occasional opportunities of mixing with the native population. They escaped, however, tolerably well. The number of venereal cases in 1858 was only forty-one, and all returned in time to their duties. It was observed that a somewhat larger proportion of the syphilitic ulcers contracted in India were followed by secondary symptoms. In the English set of cases five only manifested subsequently cutaneous eruption, sorethroat, etc.; while in the Indian, eight cases showed these symptoms. With one exception, they were readily amenable to treatment, and recovered perfectly.

For the space of five months we were stationed in the Red Sea. As the Arab population was bitterly hostile—it was immediately after the massacre of Christians at Jeddah

—the men were allowed no leave, and communication with the shore was limited and guarded. The "Chesapeake" was now ordered to the other extremity of the Asiatic continent, to become the flag-ship in China. The crew had hitherto enjoyed a high state of health. During the eighteen months we had spent in the Indian and Arabian waters we had lost but four men from disease: three from cholera and one from fever; and of the cases invalided few were of serious or climatic character. This most satisfactory health-condition, seldom attained by vessels in the most favourable circumstances and on the healthiest stations, was mainly due to the admirable hygienic arrangements of the commanding officers.

When the "Chesapeake" arrived at Hong Kong, in May 1859, venereal disease was absolutely extinct on board. The men had not been on leave for nine months, except for a few hours at Aden, and there only two cases, one of gonorrhœa and one of chancre, had ensued. Now all hands were permitted to go on shore for forty-eight hours, and about 450 of them availed themselves of the privilege. They behaved very well. Extreme drunkenness was very rare, and they returned to the ship with praiseworthy punctuality. From that single visit, however, forty-six cases of sexual disease resulted, or at least were placed on the sick list, besides, no doubt, several others of slighter character, as gonorrhœa, abrasions, etc., who did not present themselves at all, or whom it was not necessary to withdraw from duty. Whether from the peculiarity of the Chinese climate, or of the morbid poison, or by reason of the debilitated condition of the men, unused to the excitement and debauchery of the shore, the cases were less tractable than hitherto. Many of them burdened the list for a long time, chiefly those which were attended with bubo. The abscess after evacuation sometimes assumed an unhealthy aspect, degenerating into phagedenic ulcer, and slow of reparation.

In the summer of 1859 we proceeded to the north of China, and entered on a campaign which, though short, proved very disastrous. At the repulse from the Peiho Forts one-third of our attacking force either fell in action or were disabled by wounds. Besides sustaining this heavy loss, the ship was devastated by a succession of epidemics, viz., fever, cholera, dysentery, small-pox, ophthalmia. For three months, and these the hottest in the year, she became an over-crowded hospital. In that time 840 cases were admitted to the list, and ten of them terminated fatally. The

marvellous immunity from serious disease we had previously enjoyed caused our present accumulation of suffering to be all the more keenly felt. In the face of far graver maladies the venereal cases shrank into comparative insignificance.

In October the "Chesapeake" returned to Hong Kong. After the arduous toils and almost unexampled calamities they had so well endured, the crew stood much in need of relaxation. Leave was therefore allowed soon after they got into harbour. Once a month the men were permitted to go on shore for forty-eight hours—a watch at a time, that is to say, about 200 men. The petty officers and other privileged persons had the option of going once a week for twenty-four hours. The bounty voted by Parliament had just been paid. They had therefore abundance of money, and were probably more than usually licentious. The result was that in the seven months this indulgence lasted, no fewer than 195 cases of venereal disease were contracted, of such a nature as to incapacitate the men from duty. It is probably within the mark to estimate the number infected as nearly one-half of those who incurred that risk. The character of the cases was as follows:—Venereal ulcers, 104 (in 29 cases accompanied or followed by bubo); gonorrhœa, 34; orchitis, 40; stricture, 7; secondary syphilis, 10. Several of those cases are reckoned twice, chiefly the orchitic and secondary affections. With this deduction, the number of cases will be 176, almost exactly a third of the ship's company. The most tedious cases were bubo, which when either indolent in maturation, or succeeded by slowly-healing ulcers, sometimes extended over two or three months. Taking the whole, the average duration of each case was about three weeks. Secondary symptoms were rare—three of the ten cases being twice entered. They mostly occurred in persons who had trifling abrasions, and had neglected to apply in time for ectrotic treatment. In two instances they were young lads who, through ignorance or shame, did not apply at all until constitutional symptoms had appeared.

The other vessels of the squadron, and more especially the gun-boats, suffered from these disorders in similar or even greater proportion. The general hospital ship, to which the more tedious and severe cases were sent during the refitting of the ships, became inconveniently crowded, and supplementary ship-hospitals had to be established. Although it was a sickly season, from dysentery and other endemic diseases, the ratio of venereal cases was no less than 25 per cent. on the whole number of admissions, and gave

as much as 30 per cent. on the total amount of time lost to the service by sickness. The evil had assumed very serious dimensions, and called loudly for remedy.

In the colony of Hong Kong there had been established for some years a sanitary system of police in relation to prostitution. The regulations appeared to be well adapted to the end in view. A register was kept of the public Chinese women to whom Europeans resorted. Their houses (in which a native man generally presided) were recognised and licensed, and were open to the supervision of competent officers. At stated periods—I believe once a fortnight—those women were compelled to present themselves before the colonial surgeon for examination. When found to be diseased, they were at once removed to the Lock Hospital, an exceedingly well conducted institution, and remained there until their cure was complete. A small charge was made for their maintenance while under treatment, which was defrayed by the keeper of the house to which they belonged. The police magistrates had ample powers to enforce the law; and the expenses of the supervision and inspection of brothels and of the medical establishment were paid out of the colonial treasury.

However well devised and stringent these provisions were, and however effectual they might have proved formerly, it is certain that at the time of our arrival the law had become practically inoperative. Contagious disease was rife among the demoralised female population to a degree almost unparalleled even in the worst seaport towns.

As soon as I had obtained sufficient knowledge of the ordinances of the local government on the subject, and of their working (for which I was indebted to the able and zealous colonial surgeon, Dr. Murray), I lost no time in bringing them to the notice of the Naval Commander-in-Chief, and in suggesting some corrective procedure. The admiral, Sir James Hope, took up the matter willingly, and manifested the greatest anxiety to have the evil mitigated as far as possible, not only from the humane motives by which he is ever actuated, but in the public interest. For, with every wish to grant the men all reasonable indulgence and recreation, the loss of the services, temporary as it was, of so large a proportion of their number in time of war, had become a formidable grievance. It was determined to press the matter upon the civil authorities in such a manner as to fix the responsibility somewhere, so that the wholesome regulations which were actually in force should have fuller

scope, and their power tested to abate this mass of loathsome disease.

The plan adopted was this:—When a man presented himself suffering from venereal, he was asked if he knew where and from whom he contracted the disease, and also whether he could identify the person. If he could do so, he was at once sent, accompanied by the master-at-arms (the head of the ship's police) to the magistrate on shore to lodge his complaint. The woman was summoned without delay, and handed over to the colonial surgeon for inspection. If found to be the subject of disease, she was consigned to the hospital; and if, on inquiry, it turned out that she had neglected to appear at the proper times for medical examination, or, as was most often the case, that she was not on the police register, the keeper of the house was punished by fine or imprisonment. The penalties inflicted were of such severity as to be amply deterrent. Some of our men prosecuted willingly; but others, it was known, held back, although they could have given equally positive evidence. As convictions were desired, from no vindictive motive, but solely for the sake of example, a very few sufficed. The result of this interference was on the whole satisfactory. A marked decrease in the number of cases followed. At first, after a period of leave, the number of applicants used to average about forty, but latterly it did not exceed eight or ten. And so long as evasion or infringement of the law was visited with peremptory correction, the amendment in the health of the place was likely to be permanent.

Dr. Murray co-operated most effectively in the matter. He had pressed it before on the attention of the Colonial Government, and by the regularity and strictness of his inspections he had done all in his power to lessen the nuisance. Through his exertions and the aid given by the police it was brought to light that a number of unregistered brothels had sprung up, and that even in the licensed houses females were harboured whose names were not on the police books, and who consequently managed to evade the periodical examination, as well as the surveillance of the officials who made the domiciliary visits. It was chiefly those contraband women who were proved to have been the source of contagion. Some of them were reported by Dr. Murray as "dreadfully diseased." The mainland of China is separated from the island of Hong Kong by a narrow channel from one to two miles wide, and at that time was not within the jurisdiction of the colony. There was every facility for

native women to pass to and fro. When there was a great influx of men on liberty, who were well supplied with cash, the brothel-keepers were tempted by cupidity to increase surreptitiously the number of their inmates. Their unwillingness to pay the small charge made for the women's maintenance in hospital may also have induced them to conceal from the police their temporary importations. It was not easy to check this constant ingress and egress of women in the colony. The same difficulty would apply *d fortiori* to any English port where the facilities of migration were great. It is very different in such places as Malta, where no evasion of this kind can be practised. Regulations, therefore, which may have succeeded admirably there would be inapplicable elsewhere.

We had no means of fully ascertaining whether the amendment in the sanitary condition of Hong Kong was permanent, for when the ship returned thither after the successful campaign of 1860-61, she was located in a remote part of the island. Leave was not general, but the partial experience derived was favourable rather than otherwise, the admissions to the list being comparatively few. At some other ports we visited on our return voyage, viz., Singapore, Mauritius, Cape of Good Hope, and St. Helena, cases of syphilis, etc. were acquired. In the last year of the ships' commission there were seventy-one admissions for the various forms of venereal disease. During the whole period of four years and three months 419 cases occurred, a number that may give some idea of its extreme prevalence in the navy, and of the loss that accrues to the country from the deprivation of so much efficient service. In a little history like this, relating only to one vessel, the fact may perhaps be more clearly exhibited than in more elaborate statistics. But although the loss of service is a matter of national concern, it is some consolation to find that in the vast majority of instances it is only temporary. From the ship in question only six cases were invalided, during the commission, for syphilis, and in most of these co-existing disease, fever, dysentery, etc., were present, and retarded recovery. One death was recorded—a marine, who was suffering from bubo, but in reality succumbed to repeated attacks of ague and dysentery, and died in hospital of those diseases, although he had been sent thither for the venereal affection.

On the whole, the amount of deaths and invalidings from this cause would seem to be by no means very great in proportion to the enormous number of cases. Take, for ex-

ample, the China and East India station, in which, as we have seen, the disease assumed an extraordinary preponderance. In 1859 we find from the very valuable tables drawn up by Dr. Bryson, that there were 1273 cases, that their average duration was thirty-one days; the ratio of admissions to 1000 men was 193; the number of sick daily was sixteen in 1000. Yet there was no death from this cause, and only thirty-three invalidings, being in the proportion of five in 1000 men. In 1860 the number of cases had decreased; the proportion of admissions being 123 per 1000 men, and the daily number sick being ten per 1000. The number invalided, however, was augmented to nearly seven in 1000, and one death was recorded, which, however, as explained above, was only partially due to sexual disease. The number invalided from the station for all diseases was no less than eighty-four per 1000 in 1859, and seventy-two per 1000 in 1860.

From the last general statement published of the whole naval force (1860) it appears that, while the number of cases of venereal diseases bore the ratio of 113 per 1000 men, those invalided were in the proportion of only 2·3 per 1000.* This result is to be expected, for it is unquestionable that, if men in the public services are more liable to those diseases, they are also far more favourably circumstanced for their early discovery, treatment, and cure, than civilians in the same station of life, or indeed in any station.

The aggravated forms of constitutional syphilis, so often met with in civil hospitals, are hardly ever seen; and those cases of secondary disease which do occur are, as a rule, quite remediable. Yet there is no doubt that much indirect loss is occasioned by the maladies in question predisposing the subjects of them to ulterior cachexies, and more particularly tuberculosis. Recent interesting researches in the army, by Dr. Aitken and by Dr. David Milroy, would seem to indicate the existence of a specific anatomical lesion of the lung as a sequel of syphilis; and the impression is gaining ground that the pernicious influence of this animal poison extends much further than has been hitherto supposed. Be this as it may, the positive direct loss to the country is sufficiently startling. Betwixt 500 and 600 of the flower of the naval service are perennially disabled

* More recently the Statistical Report of the Navy for 1861, by Dr. A. E. Mackay has appeared. In that year the ratio of cases was 130 per 1000 men, and the proportion of invalided was 2·6 per 1000. No death is recorded as having occurred in the period.

through this cause. Their pay and the expenses attendant on their treatment, etc. may be estimated at the most moderate computation as £30,000 a year. Surely this is a heavy fine for the neglect of sanitary regulations. But besides pecuniary loss and physical injury, the demoralisation and the general deterioration of a disciplined force, which invariably ensue on a heavy sick list, must also be taken into account as an enormous evil. This can be duly appreciated only by those who are conversant with naval or military details, but it is no unimportant branch of the subject.

The liberal and enlightened policy of recent times having conceded to our seamen a larger amount of leave than they enjoyed before, it would seem expedient, if not incumbent, that the State should afford some protection to its servants against the effects even of their own vice and folly, when these involve so much physical suffering and public detriment. The naval ports are, it is well known, the chief foci of disease; and it would be well worth while trying the experiment, in the smaller towns first, of preventive measures affecting the other sex. Difficulties would no doubt be encountered, but, as it appears to me, far less insurmountable than in other towns. For the public women of a low order, with whom soldiers and sailors mostly consort, are a class *per se*. They are well known to the police. The drunken and dishonest propensities that are attributed to them, their turbulence and coarseness, render them the fitter subjects for restrictive control. If we were not viewing this matter in simply a physical light, it might be said that to impose on them a salutary discipline would possibly be the most efficacious means of reclaiming those unhappy persons from the depth of degradation into which they have fallen.

An efficient local sanitary police would include two departments:—1st. An *executive* for the registration of all the known and professed public women of the place, for visitation of their dwellings and general surveillance; and 2nd. A *medical* department for the periodical inspection of the registered, and for their treatment, when convicted of disease, in an hospital, where their entrance and detention should be legally compulsory. A modified passport-system to prevent evasion, and occasional appeals to the civil power to test the efficiency and honesty of the police supervision, would also seem to be essential. Otherwise the most elaborate arrangements might break down. The same failure would occur, as we experienced at first at Hong Kong, and a system which *prima facie* seemed perfect, would prove utterly futile

and nugatory for the purpose intended. It is not easy to introduce into this country any innovation which trenches upon our "*præsidium et dulce decus*"—the personal liberty of the subject. But we have had recent instances of the beneficial effect of enactments for the abatement of nuisances, compulsory vaccination, and other matters relating to public health. In this particular case some remedy is so urgently called for that even exceptional legislation would be warranted.

Naval ports and garrisons offer the best field for experiment, as the most accurate and certain proof of its success would be found in the diminished sick lists, and precise results could thereby be arrived at, which elsewhere would be unattainable. Public women are probably less numerous and less migratory in these places. Their character for immodesty is notorious, and their other vices are such as to render any scruples as to the indelicacy of interference superfluous. Where, as is said to be frequently the case, several women lived under one roof, and were controlled to some extent by the occupier of the house, the task of supervision would be greatly facilitated by fixing on the latter some portion of the responsibility of registration, inspection, and consignment to hospital. I will not take up the time of the Society by entering into details that may be found at great length in the works of Parent du Chatelet, Acton, and other authorities on the subject, as practised abroad. I would simply submit for your consideration the feasibility and chance of success with which a scheme of restriction might be applied to such places as Portsmouth, Plymouth, Woolwich, Chatham, Sheerness, and the camps —in all of which vice and disease are now flourishing in the rankest luxuriance. With the smaller towns (Sheerness, for example) I apprehend there would be little difficulty. Their shore population is almost exclusively connected with the service, and is not given to locomotion. The larger towns (such as Plymouth) would be less easy to manage, on account of the much larger admixture of the civil element in the community, and of the great number of women of dissolute morals, who have other means of subsistence, and do not come under the category of professional prostitutes. Yet even there much, in the way of mitigation, might be done. In addition to existing medical institutions, dispensaries, where applicants of both sexes could obtain advice and medicines at a moderate charge, privately, and at later hours than at the charities, would be desirable. They would

confer essential benefit on those labouring under disease, who would be saved from the wiles of the pernicious quacks who now trade so largely on their fears and follies.

The truth is that the male civil population are greater sufferers, and are more deeply interested in preventive measures than even naval and military men. On them—naval men at least—the disease falls extensively; but, as we have seen, comparatively lightly. It is far otherwise in civil life where, through ignorance, the shame of avowal, and the difficulty of treatment, it is very often permitted by the unhappy victim to pursue its course unchecked. The havoc and misery it sends through our youth of all ranks cannot possibly be exaggerated. The transmission of the taint to offspring is another incalculable evil, affecting all classes of society, although this, for obvious reasons, is not prominently an incident of naval life. It is, however, on our soldiers and sailors that the good accruing from State-intervention would be best exemplified. Were it attended with eminent success, we might venture to hope that in time its extension to the community at large would be amply justified. In an age of rapid material progress like this, a question that comes home to so many cannot be much longer postponed. Limited experiments fairly conducted at some one or more of the places indicated would be well worth the trial, were it only to demonstrate unmistakably how far this class of diseases is capable of control, and to familiarise the public mind to the more general adoption of preventive measures.

Much opposition will, of course, have to be encountered. Of those objections which are based on moral and social considerations, and which are now apparently strongest, there is good ground for believing that, with a daily increasing enlightenment on sanitary and social science, they will in no long time be smoothed away. The legal and financial difficulties will, I take it, prove in the long run the hardest to overcome. To prescribe rules of conduct for a troublesome section of the community, depriving them of their freedom, even when for their own advantage and that of the public, and to reconcile such rules to the mild spirit of our laws, by divesting them of a vexatious or oppressive character, will be no easy task for the legislator. The necessary expense of an adequate executive and medical establishment will also prove a formidable obstacle. These women are for the most part intemperate, improvident, and consequently poor. They occupy, to the credit probably of our social system, a far more degraded position than in most

other countries. Eleemosynary aid would be required. Fees for registration, inspection, and certificates of health, the State might perhaps condescend to accept, although probably insufficient for the expenses. But the maintenance of the women during their confinement in hospital would be attended with a considerable outlay, which could not be defrayed by the recipients of relief without help from the public purse.

These impediments, however, may assume a less serious aspect when confronted boldly. At no time has there seemed less unwillingness on the part of public writers and speakers to entertain the subject than now. Some steps have been taken by the Admiralty, and I believe by the military authorities also, in the right direction, but in a small way only.* The question is doubtless one of vast national importance, and I cannot help thinking that, if it be not considered beyond the scope of the Society, some expression of opinion on it would be very desirable. Many of the members have had much experience, acquired in various parts of the world, which would bear with advantage on the elucidation of some of the topics referred to. It is chiefly with a view to elicit the remarks and suggestions the subject would call forth, that I introduce this very imperfect and hastily-written paper. And now, in conclusion, I beg leave to thank you very respectfully for the honour you have done me in receiving it.

* Since this was written the "Contagious Diseases Act" has become law. Its effect will no doubt be beneficial, and will greatly mitigate a long-existing evil. It is to be regretted that its provisions do not extend further. A system of registration, compulsory periodical inspection, and general control as to change of residence, etc. would render the operation of the act more complete, and would pave the way for a more comprehensive measure.

ON THE CAUSE, MALIGNANCY, AND PERSISTENCE OF YELLOW FEVER ABOARD SHIP.

By A. N. BELL, M.D.,

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[*Read July 4th*, 1864.]

That yellow fever is the natural offspring of regions and places characterised by the presence of putrefying organic matter under a high temperature, is a truth now so generally admitted as to need no discussion. That all such places, however, even of similar magnitude, are not in the same degree liable to the production of yellow fever poison, is an equally certain truth; but this circumstance probably arises from some inappreciable difference in the nature of the resultant poison from different organic matter decomposing under different meteorological conditions in the aggregate, though alike, it may be, in high temperature. At least, there appears to be a difference great enough to characterise the three great deltas of the world—the Nile, the Ganges, and the Mississippi, as being the three greatest sources of the plague, cholera, and yellow fever. Hence the conclusion seems justifiable that, in proportion as the conditions comprehended in these great deltas respectively exist, exists also the liability of originating and propagating their respective infections.

Stagnant air, dampness, darkness, and warmth are frequently the inseparable conditions of the holds of vessels in warm climates. If to these conditions there be added a filthy vessel, putrid provisions, or bad water; or if the cargo consist of material peculiarly liable to infection, such as rags, hides, feathers, sponge, or sugar, the circumstances are then complete not only for the reception of the poison, but for its origination and continuance.

Unusual malignancy of yellow fever generally attends upon suddenness of exposure to the poison. Hence in places where yellow fever rarely occurs, or among a ship's company never before subject to its influence, it usually runs a more

rapid course, and is proportionately more fatal. The organism under such circumstances has insufficient time for functional adjustment, and is consequently speedily overwhelmed by the suddenness of the encounter; in the same manner as a vigorous bird quickly perishes if suddenly plunged into an impure atmosphere, which, however, is capable of sustaining one for a longer time, if brought under its influence gradually. Under such circumstances, too, the symptomotology of yellow fever is generally less perfect, and yellowness especially, which rarely occurs before the third day, is frequently absent, or does not occur until after death. Yellowness before the third day is a mark of unusual malignancy. Besides the recorded occurrences of sudden fatal epidemics of yellow fever in unusual places, by writers generally, several such have fallen under my own observation. One of the most recent, for example, was in the vicinity of this city in 1856. On the 9th of July, twenty days previous to the first case, the alluvial plain of sand extending along the east bank of New York Bay was subjected to an unusually heavy rain (1·80), which from the conformation of the land could not run off. Succeeding this followed a drought and high temperature, the mean of which for the twenty days, recorded at seven o'clock A.M., and at two and nine P.M. daily, was 82·58. The mean of the hygrometer for the same period was 75·80, and during the while there was but ·01 in. rain (on 15th). During the day on which the first case of fever occurred it rained ·30 in., and the thermometer in the afternoon of the same day rose to 95. During this drought and high temperature immediately following an almost tropical rain, the soil was doubtless several degrees hotter than the atmosphere, promoting both dampness and putrefaction. Meanwhile there was a large squadron of quarantine vessels infected with yellow fever, ranging in distance from one hundred yards to a mile of this well-prepared shore, and a prevailing wind veering only from south to west during the whole period. The poison was close at hand, had a fair wind and favourable weather. It was sown in good ground, and brought forth an abundant harvest. The epidemic was limited in extent to the unpaved sandy soil, which was subject to heavy rain without drainage, and subsequent high temperature. There were in all 175 cases. Eighty-eight occurred within the first month, and of these forty-eight were fatal. Of the eighty-seven subsequent cases only fifteen were fatal. This difference was attributed by the people in the neighbourhood, as usual in such cases, to

a better acquaintance of the physicians with the disease. But such was not the case. The physicians who saw most of it, Dr. Baley, U.S. Army, Dr. Elisha Harris, Physician-in-Chief of the Quarantine Hospital, and myself, had all seen much of the disease before, and our treatment first and last was about the same.

Some of the most distinguished writers on epidemics generally describe them as being more fatal at the beginning. This appears to be particularly the case with yellow fever: —"The rate of mortality from this disease in Philadelphia has invariably varied at different periods of the same epidemic. The late Professor Chapman, who, like most other writers on the same subject, viewed this as one of the laws of epidemics, says of the yellow fever:—'Always in the beginning mortal in every instance, progressively more tractable, till finally it becomes comparatively curable.' Of the fever of 1793, Barnwell states, 'that from its first beginning the disease exhibited something extraordinary in the mortality and rapidity of its progress, but towards the close of October and November it became less dangerous and rapid' (p. 388). The law, however, if law it is, is subject, like every other, to exceptions."*

The careful observer will, of course, not confound the fatality of yellow fever from sudden exposure with that which pertains to domiciliary conditions. All diseases are more fatal in an impure atmosphere, regardless of conditions favourable to their origin. And no length of service to a ship's company at the delta of the Mississippi can possibly fit them to successfully resist the poison of yellow fever in a vessel persistently comprehending all of the conditions most favourable to the reception of infection. The atmosphere of such a vessel is no less unfavourable to recovery from a wound than from yellow fever. But if a new crew from a different climate should be suddenly subjected to these aggravated conditions, the disease among them would be much more fatal than among those who have had some degree of acclimatisation. Malignancy of yellow fever, therefore, appears to depend primarily and most generally upon suddenness of exposure to the poison; and, secondarily, upon an atmosphere unfavourable to recovery.

The *persistence* of yellow fever aboard ship necessarily involves the question as to its direct cause. But, fortunately, whatever difference of opinion may exist as to the nature of

* La Roche on Yellow Fever, vol. i, p. 525, et seq.

the virus of yellow fever, there can be no question as to the conditions of its existence. The decomposition of organic matter under certain climatic conditions is an essential requisite. And the propagation of the virus, it is well known, most readily takes place under the same conditions as give it origin. Certain *material* of commerce and clothing, when exposed to the conditions which evolve the virus of yellow fever are prone to become infected, and such things become new centres or fomites for its retention and further propagation. If, therefore, a ship is in such a state, or has such material on board as will favour the reception of the poison, she is proportionately well conditioned for its retention. And it will exist under such circumstances just as long as the conditions favourable to the decomposition of organic matter exist; but upon the suspension or cessation of these, the evolvement of the virus will also be suspended or cease. If suspended only, as they are annually in Vera Cruz, by the moderately cold north wind, or as in H.M.S. "Jason," 1861-2,* under favourable climatic conditions, it will again be renewed, and, it may be, transported to far distant, though similar regions to that from which it took its origin.† Hence the liability of yellow fever to occur annually in some places, and to break out again and again aboard of the same ship, and to be propagated to new localities favourable to its reception, even where it has never existed before. Fomites from a vessel thus conditioned may be so warmly and securely packed as to admit of transportation even into a comparatively cold climate, and yet continue for a time liable to strike a fatal blow when least expected.

A woman died at the Brooklyn City Hospital last July of yellow fever, contracted from her husband's clothing, closely packed, and sent to her from New Orleans. Several similar cases have fallen under my observation. The virus of yellow fever, however, has no power of reproduction in, or evolvement from, the human system, and cannot therefore be transmitted by one person to another, or from the person to any substance, and in this consists the non-contagious character of the disease.

The most effectual means of getting rid of yellow fever infection aboard ship, or that which may be contained in

* Dr. Slayter's Notes on the recent Prevalence of Yellow Fever in several of H.M. Ships on the West India Station. *Trans. Epidem. Society*, vol. i, p. 360-1.

† See Dr. Archibald Smith's interesting narrative of the Yellow Fever of the Peruvian Andes. *Trans. Epidem. Society*, vol. i, p. 282, et seq.

fomites, are suggestive of the true nature of the virus. They are precisely those which are known to be most efficacious for the arrest of putrefaction, namely, the extremes of temperature and powerful chemical agents. A freezing temperature, or a degree of heat sufficient to coagulate albumen, effectually destroy it. Approximate temperatures to these extremes usually only arrest it for brief periods of time. And so, too, of chemical agents; if they are powerful and highly concentrated, such as are known to decompose organic matter, or permanently arrest putrefaction, they will effectually destroy infection; if less highly concentrated, they only arrest the activity of the poison for a brief period, and leave it liable to revive again on the first favourable opportunity.

Such are, briefly, my conclusions from a somewhat extensive observation and research on the conditions of yellow fever aboard ship, and its propagation into new localities. Examples illustrative of these views may be deduced from the recorded observations of many of the closest observers of this disease, though entertaining, perhaps, widely different views from those herein stated.

Brooklyn, N.Y., April 1st, 1864.

RESULTS OF RE-VACCINATION IN THE BRITISH AND SOME OF THE CONTINENTAL ARMIES,

WITH REMARKS ON ALL CASES OF SMALL-POX REPORTED AS HAVING OCCURRED AMONG THE TROOPS FROM 1859 TO 1861 AT THE HOME AND FOREIGN STATIONS OF THE ARMY.

By Dr. FRANCIS BOWEN.

(*Read 4th July*, 1864.)

1859. *United Kingdom.*—In the annual reports of the Army Medical Department for 1859, '60 and '61, Dr. Balfour shows that a large reduction in mortality and in the occurrence of small-pox can be shown to have taken place from the practice of re-vaccination, as to leave no doubt of its practical efficacy.

In 1858, in consequence of a number of cases of small-pox having occurred in the army, particularly in India, among persons who had, to all appearance, been previously satisfactorily vaccinated, a departmental order was issued to the effect that every recruit, without exception, on joining the head-quarters or depôt of the corps or regiment to which he belongs shall be vaccinated, even if he should be found to have marks of small-pox or of previous vaccination, and that a monthly return of the results (as to

(1.) A perfect vaccine pustule following the operation, or
(2.) A modified one, or
(3.) A failure)

shall be forwarded to the Director-General. Under these orders also a number of soldiers, in whom the marks of vaccination were not deemed satisfactory, were vaccinated, and the results were kept separate from those of the recruits. As the returns began to be furnished in Oct. 1858, the results of the last three months of that year have been included with those of 1859, with a view to render available all the information upon this very important subject. The following tables show the degree of success which attended re-vacci-

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* Annual Report, 1859, p. 21.

nation in 1000 cases in each of four different categories, together with the general result upon all the men vaccinated :—

Army exclusive of Militia.	Total No. Vaccinated.	Results.	Marks of previous small-pox.	Good marks of previous vaccinatn.	Doubtful marks of previous vaccinatn.	No marks of previous vaccin. or small-pox.	Total.
Soldiers...	4,403	Perf. pustule	414·50	423·50	294·12	488·96	413·13
		Modified do.	200·74	179·69	363·44	167·19	201·23
		Failure	384·76	396·81	342·44	343 85	385·64
		Total	1000·	1000·	1000·	1000·	1000·
Recruits..	21,686	Perf. pustule	350 06	388·71	427·61	536·64	398·37
		Modified do.	187·09	221·16	251·93	206·06	217·33
		Failure	462·85	390·13	320·46	257·30	384 30
		Total	1000·	1000·	1000·	1000·	1000·

Embodied Militia.	Total No. Vacci-nated.	Results.	Marks of previous small-pox.	Good marks of previous vaccinatn.	Doubtful marks of previous vaccinatn.	No marks of previous vacc. or small-pox.	Total.
Soldiers...	1,598	Perf. pustule	327·07	294·57	612·12	451·85	346·0
		Modified do.	191·73	236·44	193·94	192·59	220·90
		Failure	481·20	468·99	193·94	355·56	433·04
		Total	1000·	1000·	1000·	1000·	1000·
Recruits..	4,823	Perf. pustule	351·14	295·00	415·18	585·03	326·97
		Modified do.	212·28	248·59	174·11	105·45	230 77
		Failure	436·58	256·41	410·71	309 52	442 26
		Total	1000·	1000·	1000·	1000·	1000·

The practice of re-vaccination has been adopted in most of the continental armies for many years, and the results in some of them have been published by Mr. Simon, in his report on vaccination, made to the General Board of Health, 1858. The following table shows the results in the Wirtemburg, Bavarian, and Prussian armies, compared with the preceding :—

	Number of Re-vaccinations.	Results in 1000 Re-vaccinations.		
		Perfect success.	Modified success.	Failures.
Wirtemburg	14,384	340·2	248·3	411·5
Bavarian	46,023	347·3	220·6	432·
Prussian (1836-40)	216,426	456·3	215·0	328·7
British (recruits).....	21,686	346·1	220·9	433·

The returns of the Wirtemburg army alone have been published with the same detailed information, and the results are therefore submitted for the sake of comparison :—

Degree of success of Re-vaccination.	Of cases with normal cicatrices of vaccination there were 7,845; and the results per 1000 were	Of cases with defective cicatrices of vaccination there were 3,515; and the results per 1000 were	Of cases with no cicatrices of vaccin. or small-pox there were 2,025; and the results per 1000 were	Of cases bearing marks of previous small-pox there were 266; and the results per 1000 were
Perfect.....	310·4	280·7	337·3	319·5
Modified	280·5	259· ..	191·1	248·1
None	409·2	460·4	471·6	432·3

The deductions to be drawn from the preceding facts are so clearly stated by Mr. Simon, that we give an extract of them from his report:—

"Is it then a legitimate inference from these figures, that if the same soldiers had been exposed to an atmosphere of small-pox infection, every third man would have caught the disease? Certainly not. Inoculation of lymph (whether vaccine or variolous) is, so to speak, a finer and more delicate test of susceptibility to the small-pox poison than is the breathing of an infected atmosphere; so that many persons, when the lymph of cow-pox or small-pox is inserted into their skin, will give, locally at least, evidences of susceptibility which no atmospheric infection would have elicited from them And of this perhaps there can be no more ready illustration than by noticing (either in another part of the annexed, or on a still larger scale in a subsequent table, which represents the re-vaccinations of Russian soldiers at Kasan) that persons who bore marks of previous small-pox were, in at least equal proportion with previously vaccinated persons, capable of producing perfect vaccine vesicles; and probably they too, if tested with variolous matter, would have shown at the inoculated part similar signs of susceptibility, whereas, notoriously, of persons who have once had small-pox not nearly one-third becomes afterwards capable of contracting small-pox by frequenting the neighbourhood of the sick.

"For this reason (greatly corroborated by what had already in every-day practice been observed of the immunity of once vaccinated persons) it was evidently impossible to argue that all who on re-vaccination yielded perfect vaccine vesicles would, on ordinary exposure to small-pox infection, have become infected with small-pox. On the other hand,

there could be little reason to doubt that they would have been distinctively the *endangered class*. Not that all, or nearly all, of them would have suffered, but that from among them more than from among other vaccinated persons, the occasional sufferers by small-pox would have come." (P. 34.)

In proof of the practical value of re-vaccination, Mr. Simon states, on the authority of Professor Heim, that in Wirtemburg:—

"During the five years 1833-7, though small-pox infection had been sixteen times imported into different regiments of the army, there had ensued among the 14,384 re-vaccinated soldiers, only—in the person of one whose re-vaccination two years before had been followed by 'modified success'—a single instance of varioloid." (P. 35.)

In the Prussian army:—

"During the ten years preceding 1831, cases of post-vaccinal small-pox were increasing in number and fatality; attacks were counted annually by many hundreds, and within the three years 1831-3 there had occurred no fewer than 312 *deaths* by small-pox. For the last twenty years the Prussian army has represented an almost entirely re-vaccinated population. And what has been the contrast?—104 annual deaths by small-pox was the last experience of the former system; *two annual deaths* by small-pox has been the average for the re-vaccinated army. Analysing, moreover, the *forty fatal cases* of small-pox which, during the last twenty years have occurred in the Prussian army, we find that *only four* of the number were persons who (it is said) had been successfully re-vaccinated."

The report on the results of re-vaccination in the Prussian army during 1862 has been published. From this "it appears that 19,545 individuals were vaccinated or re-vaccinated during the year. Of these 16,669 exhibited distinct cicatrices from former vaccinations, 1852 indistinct traces, and 1024 no traces at all. The present vaccination pursued a regular course in 12,272 of the 19,669 soldiers vaccinated, and an irregular course in 2738, while in 4534 it was followed by no results. On these last being again vaccinated success attended it in 1324. Among all the soldiers of the Prussian army on whom vaccination had been successfully performed, either during or before 1862, four became the subjects of varicella, ten of varioloid, and one of true variola. Besides these fifteen cases, there occurred also two cases of varicella and three of varioloid among soldiers who had not

been re-vaccinated; and the same number in others who had been re-vaccinated without result, making altogether twenty-five cases, viz., eight of varicella, sixteen of varioloid, and one of variola. The case of variola occurred in an artilleryman, aged 57, and proved fatal, being the only example which has been met with in the Prussian army of fatal variola after successful vaccination.

"From 1843 re-vaccination has been compulsory in the Bavarian army; and from that date to the present time, we are told, *neither a single death* by small-pox, *nor even a single case* of unmodified small-pox has occurred in that population. For the last twenty-one years, re-vaccination has been general in the Danish army, and for the last thirteen years in the Danish navy; and these two populations, we are informed, have almost *entirely* escaped contagion during several epidemics of small-pox. The practice of Sweden has been similar, and its results also satisfactory." (P. 36.)

These details relating to other armies are sufficient to show the practical importance of the measure, and to lead us to anticipate from its adoption a similar reduction in the prevalence and mortality of small-pox in the British army when the practice has been sufficiently long established.

In October, 1859, erysipelas followed the operation of re-vaccination *in four cases* in the Depôt Battalion at Parkhurst, Isle of Wight, and in one of these sloughing to such an extent occurred as to render amputation close to the shoulder-joint necessary. There was at the time a considerable amount of typhoid fever and erysipelas among the inhabitants of Newport, and several cases had occurred in Newport, and several cases had occurred in the barracks. Re-vaccination and indeed all other surgical operations were consequently suspended, but unfortunately not till after these cases had occurred. These are the only accidents which have been reported in connection with *upwards of* 32,000 *cases of re-vaccination*, of which the results are given in the preceding tables.

In 1859, in the United Kingdom, the admissions by small-pox amounted to 175 and the deaths to seven. Of the latter, one occurred at Brighton, and one at Dublin, in the cavalry; one at Woolwich, in the Royal Artillery; one at Dublin and one at the Curragh, in the infantry; and one at Chatham and one at Walmer, in the Depôt Battalion. Of twenty-seven cases in the cavalry, seventeen occurred in the 11th Hussars, at Brighton, in January and February. They

are all stated to have borne marks of vaccination, and it may be inferred from the low rate of mortality that it proved an efficient safeguard.

The system of re-vaccination for 1860, as detailed in the report for last year, has been continued, and the following table shows the result of the operation in every 1000 cases :—

Army exclusive of Militia.	Total No. Vaccinated.	Results.	Bore marks of previous small-pox.	Good marks of previous vaccina.	Doubtful marks of previous vaccinat.	No marks of previous vaccin. or small-pox.	Total.
Soldiers ...	1,880	Perf. pustule	441·	441·98	561·73	458·64	464·90
		Modified do.	111·80	183·35	157·41	214·29	177·12
		Failure	447·20	374·67	280·86	327·07	357·98
		Total	1000·	1000·	1000·	1000·	1000·
Recruits..	15,896	Perf. pustule	407·31	440·26	540·51	616·89	461·63
		Modified do.	253·36	248·17	236·17	194·	242·32
		Failure	339·43	311·57	223·32	189·11	296·05
		Total	1000·	1000·	1000·	1000·	1000·

On comparing these with the results shown in the report for 1859, it will be found that the proportion of instances of successful vaccination has considerably increased; that there has been a decrease in the proportion of failures, and that a modified pustule has been obtained more frequently than formerly among recruits who bore marks of previous small-pox, or doubtful marks of vaccination, and among soldiers who bore no marks, but less frequently in the other groups.

During the year 140 *cases* of small-pox and nine *deaths* have occurred in a force of 85,443, exclusive of militia, being in the ratio of 1·68 cases, and ·105 *deaths per* 1000 *of strength*. The disease appears to have prevailed to a considerable extent at some of the stations of troops—thus twenty-four cases are returned from Devonport, twenty-two from Chatham, nineteen from London and Windsor, fourteen from Woolwich, eleven from Parkhurst, ten from Aldershot, ten from Dublin, six from Perth, three from Stirling, and three from Colchester; the remainder appear to have been sporadic cases, scattered over the country. Of the 140 cases, *twenty-eight have been reported to have been confluent, seventeen severe but not confluent, and ninety-five mild.* The following table shows how the cases and deaths were distributed :—

	Con-fluent.	Severe.	Mild.	Total.	
				Adm.	Died.
Having marks of previous small-pox...	...	1	2	3	...
„ „ vaccination	26	15	93	134	7
Having no satisfactory marks	2	1	...	3	2

From this it appears, that while the mortality of the cases bearing marks of vaccination was only *one in nineteen*, of those having no marks it was *two in three*. No case has been reported in which any unpleasant result followed the practice of vaccination.

The following table showing the numbers of recruits found fit for service in 1860, who bore respectively marks of small-pox or vaccination, or who had no satisfactory mark of either, may be considered as approximative evidence of the extent to which the general population is protected by vaccination :—

1860. United Kingdom. Recruiting Districts.	Marks of small-pox.	Marks of vaccinat.	No satisfactory mark.	Proportion in every 1000.		
				Marks of small-pox.	Marks of vaccinat.	No marks.
London	406	5,165	553	66	844	90
Liverpool	1,360	1,803	541	367	427	146
Bristol	215	2,587	818	71	857	72
York	231	1,371	184	129	768	103
Edinburgh.....	72	700	113	81	791	128
Glasgow	144	966	114	118	789	93
Belfast	99	708	48	116	828	56
Dublin	281	1,820	210	102	805	93
Cork	133	719	14	154	830	16
Total: England...	2,212	10,926	1,496	151	747	102
„ Scotland...	216	1,666	227	102	790	108
„ Ireland ...	463	3,247	272	116	816	68
Total	2,891	15,839	1,995	369	2,353	278

Thus it appears that the number of men bearing marks of vaccination is greatest in the Irish districts and least in the English; that the number wholly unprotected is greatest in Scotland. If, however, we examine the results by districts, Liverpool shows much the largest proportion unprotected, and next to it stands Edinburgh, while Bristol has the highest ratio of men bearing marks of vaccination.

During the year 1861, 2053 soldiers and 4395 recruits were vaccinated, with the following results :—

Class.	No.	Results.	Bore marks of previous small-pox.	Good marks of previous vaccinat.	Doubtful marks of previous vaccinat.	No marks of previous vaccin. or small-pox.	Total.
Soldiers...	2,053	Perft. pustule	451·4	484·6	236·8	326·	430·6
		Modified do.	159·6	157·4	505·3	277·5	218·7
		Failure.....	389·	358·	257·9	396·5	350·7
			1000·	1000·	1000·	1000·	1000·
Recruits...	4,395	Perft. pustule	345·5	407·3	461·3	527·3	415·5
		Modified do.	266·8	240·8	301·3	202·6	242·5
		Failure.....	387·7	351·9	237·4	270·1	242·
			1000·	1000·	1000·	1000·	1000·

These results show a smaller proportion of vaccine pustules and a larger ratio of failures, especially among the recruits than the returns of the preceding year.

During the course of the year, in an average force of 88,955 men, there were fifty-one cases of small-pox reported, of which four died. They are all stated to have occurred in men bearing marks of vaccination. Of these fifty-one cases of small-pox, twenty-three occurred at seaport towns, twelve at stations of depôt battalions, and sixteen were distributed among the other groups; fourteen of the cases were at Devonport and Plymouth, eight at Dover, and eight at Limerick.

The proportion of recruits bearing marks of vaccination is shown by the returns of the different recruiting districts to have been as follows:—

1861. Recruiting Districts.	Marks of small-pox.	Marks of vaccinat.	No satisfactory marks.	Proportion in every 1000.		
				Marks of small-pox.	Marks of vaccinat.	No satisfact. marks.
London	105	1,853	147	50	880	70
Liverpool	168	883	143	141	739	120
Bristol	111	938	131	94	795	111
York	61	516	56	96	815	89
Edinburgh.....	23	276	42	68	809	123
Glasgow.....	77	670	62	95	828	77
Belfast	46	382	7	106	878	16
Dublin	62	519	55	98	816	86
Cork	24	221	13	93	857	50
England.....	445	4,190	477	87	820	93
Scotland.....	100	946	104	87	823	90
Ireland	132	1,122	75	99	844	57
Total	677	6,258	656	273	2,487	240

This table shows a considerably lower proportion than in the preceding year of men bearing marks of small-pox, and also a slight reduction in the proportion bearing no satisfactory marks.

The following cases of small-pox have occurred among the troops serving at the foreign stations of the army, from whence reports have been received :—

"The average strength during the year 1859 in the garrison of Gibraltar was 5153; during the last quarter fifteen cases of small-pox occurred. It appears to have been introduced into the garrison by two seamen, who were sent into hospital on the 23rd of October, from H.M.S. "James Watt." In seven of the fifteen cases the men were attacked while under treatment in hospital for other diseases, and of these one died; the others were admitted from barracks. The Royal Artillery had two cases; the 2nd Battalion 8th Regiment four, all of them previously in hospital; the 25th Regiment one; and the 100th Regiment had eight, of whom three patients in hospital. These men are all stated to have borne marks of previous vaccination, and only *two* of the cases are reported to have been severe. The disease appears to have spread among the crew of the "James Watt," but the subsequent cases were treated in a hulk set apart for the purpose.

In 1860, with an average strength during the year of 5609 in the garrison of Malta, there were two deaths from small-pox; one in the 2nd Battalion 8th Regiment, and the other in a man of the 100th Regiment, who had been invalided to England, and was admitted into hospital with small-pox immediately on his arrival at Chatham, in the end of December, 1859. It was evident that the disease had been contracted at Gibraltar, where it was at that time prevailing to a considerable extent.

In 1861, with an average strength during the year of 6185, exclusive of the Royal Malta Fencible Artillery, small-pox was epidemic among the civil population, and twenty cases and two deaths occurred among the troops. All the men had been previously vaccinated, and one of the two who died had likewise had small-pox. The deaths occurred in the Royal Artillery and Royal Engineers.

In 1860, with an average strength of 1742 in Nova Scotia and New Brunswick, and while small-pox was prevalent to a considerable extent among the civil population in both of these places, only two cases occurred among the military, one at Halifax and the other at St. John's. Both the men

attacked were gunners of the Royal Artillery, who bore satisfactory marks of previous vaccination, and had the disease in a very mild form.

In 1861, with an average strength of 1725, exclusive of the Royal Newfoundland Companies, there were six cases of small-pox and one death. The disease prevailed as an epidemic among the civil population of Halifax and of St. John's, Newfoundland, for several months. Five of the admissions were at Halifax, and the other in the detachment at St. John's, Newfoundland. The death occurred in the Royal Artillery.

The average strength of the white troops in the Windward and Leeward command during the year 1860 was 1255. Small-pox was very prevalent among the civil population of Barbadoes during the year, but only three cases occurred among the white troops, and all of a mild character. Among the black troops fifty-eight cases occurred; fifty at Barbadoes, five at Trinidad, and three at St. Lucia. It proved fatal in two cases only, and in one of these the man had not been vaccinated.

The average strength of the black troops during the year 1860 was, at Sierra Leone, 379; at the Gambia, 350; on the Gold Coast, 313. Small-pox which, at the close of 1859, was epidemic at Sierra Leone, ceased about the end of January. There were ten admissions from it during that month, all of which terminated in recovery. In the end of September small-pox broke out at Cape Coast Castle in the garrison and town, but was checked by the prompt seclusion in Fort William of all who were attacked, whether military or civilians. Seven cases occurred among the troops, and all recovered. In the Gambia, in 1861, fourteen cases occurred among the troops during an epidemic of small-pox, and all recovered.

The average strength of H.M. regiments serving in India for 1860, including Burmah, was 64,455. It is to be understood that neither the European or Asiatic troops composing the army of the late Hon. East India Company are included. From the quarterly returns it appears—in the Rohilcund division twenty admissions and two deaths by small-pox occurred; in the Sirhind division, thirty-eight admissions and three deaths; and in the Meerut division, eighteen admissions and four deaths. Umballah, Shahjehanpore, and Meerut were the stations at which the disease chiefly prevailed.

The average strength of the European troops in the north

of China in 1861 was 3113. Small-pox prevailed among the men stationed at Tien-tsin during the six weeks of their occupation in 1860, and continued until the end of March, 1861. During that period thirty-four cases and four deaths occurred, of which nineteen and two were in 1861. The men attacked were all reported to have marks of previous vaccination.

As stated at the commencement of this report, the statistics brought before your notice prove, as Dr. Balfour states, "that so large reduction in mortality and in the occurrence of small-pox has taken place from the practice of re-vaccination as to leave no doubt of its practical efficacy."

MEMOIR OF JAMES ORMISTON M'WILLIAM, M.D., F.R.C.P., C.B., F.R.S.

By Dr. BABINGTON, F.R.S.

James Ormiston M'William was born at Dalkeith on Sept. 5, 1807. He received his medical education under Dr. Andrew Walter and Mr. Charles Graham, of that town, and subsequently became a licentiate of the Royal College of Surgeons, Edinburgh, and an M.D. of the University of that city. He entered the Royal Navy as assistant-surgeon in 1829, and serving on board H.M.S. "North Star" and "Canopus" in that capacity on the home, West India, and Mediterranean stations, was promoted to the rank of surgeon in the year 1837. While serving on the West Coast of Africa during the years 1837-38 and 39, he received the Blane Gold Medal for the best medical journal in the naval service.

In 1841 he volunteered to accompany the Niger expedition, and was selected as principal medical officer, and the command of the expedition having devolved upon him in consequence of the sickness or death of all the executive officers, his conduct on that trying occasion was thus mentioned by Captain Trotter, the commander of the expedition :—

"Her Majesty's Steam-vessel 'Albert', Clarence Cove, Fernando Po, 25th October, 1841.

"The cases of sickness, however, continued to increase, till at length, when we got to Egga, on the 28th of September, the only remaining engineer was taken ill, and no officers, excepting Dr. M'William, Mr. Willie, mate, and myself, were free of fever. We continued wooding and preparing to return down the river till the 4th of October, when I was myself seized with fever, and Mr. Willie a day or two afterwards.

"On the 5th of October Mr. Willie weighed and dropped down the river, but was soon prevented by sickness from carrying on duty, and Dr. M'William, assisted by only one white seaman, lately recovered from fever, took charge of the vessel, not thinking it right, in my state of fever, to report Mr. Willie's illness.

"For want of engineers, we should have had to drop down the whole length of the river without steam, had not Dr. Stanger, the geologist, in the most spirited manner, after

consulting Tredgold's work on steam, and getting some little instruction from the convalescent engineer, undertaken to work the engine himself. The heat of the engine-room affected the engineer so much as to throw him back in his convalescence and prevent his rendering any further assistance, but Dr. Stanger took the vessel safely below Eboe, without anything going wrong with the machinery, whilst Dr. M'William, in addition to his enormous press of duty as a medical officer, conducted the ship down the river in the most able and judicious manner. I may here mention, that the doctor steered the ship entirely by Commander William Allen's excellent chart of the Niger, of the correctness of which we had a good opportunity of judging on ascending the river, and which proved eminently useful on the passage down; and Mr. Brown, clerk, a native of Africa, who had been up the river before, also rendered him considerable assistance in the pilotage.

"I have before mentioned the exertion and judgment displayed by Dr. M'William, the surgeon of this vessel, in bringing her down the greater part of the Niger in safety; but this would be considered the more remarkable, if it were possible to convey to their lordships the exertions and fatigue he had to go through in his attendance upon the sick. I cannot speak too much in praise of this valuable officer, nor feel thankful enough that a man of so much talent and energy was appointed to the expedition.

"I have already alluded to Dr. Stanger's praiseworthy conduct in his acquiring a knowledge of the steam-engine, by which we were enabled to get down the river so much more speedily than we otherwise could have done; but this gentleman, if possible, was still more useful in the medical assistance which he rendered to Dr. M'William, who latterly had no assistant-surgeon to relieve him in his duties. I am sorry that Dr. Stanger is beginning to feel the effect of his exertions, having had fever (though slightly) within the last two days. I must also mention Mr. Mouat, assistant clerk, who having served several years with a surgeon in London, was able to render great satisfaction in the medical department up the river, and is particularly of use at this moment when Dr. M'William and Mr. Woodhouse, assistant-surgeon, are ill. I beg to recommend to their lordships' consideration the propriety of remunerating this gentleman for his services, more particularly as his pay as clerk's assistant is so very small. In bringing before their lordships' notice the admirable conduct of the surgeon and acting surgeons of the

expedition, I wish by no means to disparage the exertions of Mr. Woodhouse, the assistant-surgeon of the 'Albert,' or those of the deceased medical officers, which were very great, though not of so responsible a nature as those of Dr. M'William and Dr. Pritchett, or of Mr. Thompson, who, before he descended the river with the large number of the sick in the 'Soudan,' was for a length of time doing duty in that vessel, during the protracted illness of the late acting surgeon, Mr. Marshall. The number of deaths that happened after the vessels got through the Delta, until the sailing of the 'Wilberforce' hence for Ascension, is shown in the enclosed paper. I have no exact return of the number taken ill in the 'Wilberforce,' but I believe it may be stated that only five white persons escaped the fever in that vessel, while there are only four who have not been attacked in the 'Albert' up to the present time, and no white person in the 'Soudan' escaped it; and when I add that Dr. M'William is of opinion that few, if any, will be fit to return to the coast of Africa who have had the fever, and that every lieutenant, except Mr. Strange, all the medical officers but Dr. Pritchett and Mr. Thompson (it is doubtful yet whether Dr. M'William has the river fever or not) all the mates, masters, second masters, and clerks, the whole of the engineers and stokers of the expedition, and the gunner of the 'Albert,' (the only vessel that has an officer of that rank) have been attacked, their lordships will be able to form an idea of the paralysed state of the steam-vessels."

When it is considered that the command which thus devolved upon Dr. M'William was of three ships, two of them of 460 tons, and the third of 250 tons burthen, and which had when they started, in all, 178 souls on board, the arduous nature of this extra, yet paramount, duty may be conceived.

On his return from the Niger expedition in November 1842, he was appointed surgeon-superintendent of the "Forfarshire," employed in conveying convicts to Norfolk Island, and the next year he performed a similar duty in the "Hyderabad."

In 1843 Dr. M'William published *The Medical History of the Niger Expedition* in an octavo volume. The title of this book is characteristic of the modesty of its author, for it is not only a medical history, but a general account of this unfortunate undertaking. The work was most favourably reviewed by the leading journals of Europe and America.

In 1846 Dr. M'William was selected by the Director-General of the Naval Medical Department to proceed to the

Cape de Verd Islands, and investigate the nature and origin of a severe epidemy of yellow fever, at that time prevailing at Boa Vista. The severity of the visitation and the heavy responsibility which was thus thrown on Dr. M'William may be inferred from the single fact, that the mortality on the island on this occasion, from yellow fever alone, amounted to 10 per cent. of the whole population. An official report "On the fever of Boa Vista" having been presented to Parliament by Dr. M'William, was ordered to be printed, and was also, like the volume on the Niger Expedition, most favourably reviewed by the periodicals, not only in this country but throughout Europe. Sir William Pym, Superintendent-General of Quarantine, thus speaks of the report in question :—

Return to an Address of the Honourable the House of Commons, dated May 14, 1847 ;—*for*

"A copy of the letter addressed by Sir William Pym to the Lords of the Council, dated April 23, 1847 (headed Eclair Fever), relative to a report on the fever at Boa Vista, one of the Cape de Verd Islands, by Dr. M'William."

"ECLAIR" FEVER.

"April 23rd, 1847.

"Sir,—Agreeably to the desire of the Lords of Her Majesty's Council that I should state my opinion upon the report submitted by Dr. M'William, surgeon R.N., to the Lords of the Admiralty, relative to the fever which prevailed at Boa Vista, one of the Cape de Verd Islands, in the years 1845 and 1846 (supposed to have been introduced to that island by communication with the crew of Her Majesty's ship 'Eclair'), I have the honour to state for the information of their lordships, that I consider Dr. M'William's report to be a most valuable document, and that the variety of uncontrovertible evidence brought forward by him relative to the disease in question, has finally decided and set at rest a most important and long contested question relative to the nature and history of yellow fever, more particularly as to its infectious power.

"Dr. M'William had, from the peculiar circumstances attending the 'Eclair' steamer, and the intermediate position of the small island, on which there was a military guard, with reference to the Island of Boa Vista itself, a most favourable opportunity of following up his investigation, which I cannot help saying he has done with great judgment, perseverance, and impartiality.

"The chief instruction given to Dr. M'William was to inquire whether any disease of a similar nature to that which existed on board the 'Eclair' prevailed in Boa Vista after the departure of that ship from the island, or, in other words, to ascertain 'whether it could be fully and satisfactorily shown that any person who had visited the ship or tents where the sick were placed, contracted the fever in question, and communicated it to others, and they to other persons in succession, who had not visited the ships or tents.' Those questions which have reference to the infectious or contagious power of the yellow fever, as I have before stated, Dr. M'William has finally settled and brought to a complete test; and he deserves well of his country for the manner in which he has executed his mission."

The importance of Dr. M'William's services at Boa Vista is also thus recorded by Lord Howard de Walden and Seaford, at that time Her Majesty's Ambassador at the Court of Lisbon:—

"I have the satisfaction of affording my testimony to the high sense entertained by the Portuguese Government of the services rendered by Dr. M'William at Boa Vista, to the population of that island, while suffering under a fever of the greatest malignity, which was supposed to have been introduced by affording hospitality to one of Her Majesty's African cruisers in 1846.

"I was British Minister at that time at Lisbon, and have therefore cognizance of the sentiments with which the Portuguese Government appreciated the zeal and devotion with which, notwithstanding the danger and panic by which he was surrounded, Dr. M'William fulfilled his duties on that momentous and eventful occasion.

(Signed) "HOWARD DE WALDEN AND SEAFORD.

"Bruxelles, June 16, 1856."

Public services so important as those rendered by Dr. M'William, and which required such a rare combination of judgment, professional knowledge, perseverance, and unflinching firmness and courage were not likely to be overlooked. In 1846 he was appointed to the office of medical inspector of her Majesty's Customs by Lord John Russell, "in consideration of his distinguished and devoted services on the coast of Africa and on the expedition up the River Niger."

The duties of this appointment, which Dr. M'William was the first to hold, are far from light. They involve a personal inspection of those who from sickness are unable

to attend to their duties, among many hundred officers of Customs of various ranks. Of these some may be capable of attending at the inspector's house, but by far the greater number, being too ill to make their appearance there, are visited at their own abodes, which are situated in all directions in the suburbs of London. These were the routine duties of Dr. M'William, but the kindness of his nature led him materially to add to them by frequent attendance on the families of those who alone were entitled to his medical services.

On the retirement, from illness, of Mr. Tucker, Dr. M'William, who had previously, in 1850, accepted the office of joint honorary secretary of the Epidemiological Society with that gentleman, carried on his duties alone, and indeed added to them the difficult task of gathering in without the aid of a collector the subscriptions due to the society. He published various papers in the journals of the day, as,

"Observations on that portion of the second Report on Quarantine by the General Board of Health, which relates to the Yellow Fever Epidemic on board H.M.S. 'Eclair,' and at Boa Vista," 1852. Contrib. "On Malaria as a Source of Fever in Warm Climates," *Athen.* 1844; "On the Contagion of Cholera," *Med. Gaz.* June 1849; "On the Use of the Bonfareina (Ricinis Communis) as a means of exciting Lactation among the Natives of the Cape de Verds," read before the Brit. Assoc., Edin. 1850, *Lancet*, 1850; a paper entitled "Statistical Account of the Health of the Waterguard and Waterside Officers of H.M. Customs," read at the meeting of the British Association for the promotion of Social Science, held at Birmingham in 1857; "On the Health of Merchant Seamen," Dublin, 1861; and, lastly, two elaborate reports on Epidemics throughout the world, printed in the *Transactions* of the Society.

In recognition of his services to his country, he was appointed a Companion of the Bath by her Majesty in 1858, and a Fellow of the Royal College of Physicians of London in 1859. The painful circumstances of his death this spring, in his 55th year, are too well known to need narration here. Suffice it to say that we cannot but deeply deplore the untimely end of a man so distinguished for a knowledge of his profession, for sound judgment, undaunted courage, and untiring zeal and energy.

I had almost omitted to mention that in 1858 the medical officers of the Royal Navy presented him with a service of plate in recognition of his valuable exertions in promoting naval medical reform; and that since his death both the naval medical service and the civil members of our profession have raised a subscription for the benefit of his widow and nine children, eight of whom are daughters.

EPIDEMIOLOGICAL SOCIETY.

ADDRESS AT THE OPENING OF THE SESSION, 1864-65.

By GAVIN MILROY, M.D., President.

[*Delivered November 7th*, 1864.]

The new programme paper recently issued by the Council states, in its opening sentence, that "the Society was instituted in 1850 for the study of epidemic and endemic diseases, with special reference to the investigation of (*a*) the various external or physical agencies and the different conditions of life which favour their development or influence their character; and (*b*) the sanitary or hygienic measures best fitted to check, mitigate, or prevent them." And then, after enumerating the principal subjects which will engage attention, it points to the wide area over which our inquiries extend, and adds, "It will thus be seen that the labours of the Society are directed to the investigation of many of the most important problems of State Medicine and public hygiene in their most comprehensive acceptation, and embracing all countries and nations. The Epidemiological is, thus truly, an International Society."

This leading twofold division of research, viz., the study of the causation of epidemic and endemic diseases, with reference to their prophylaxis and prevention, and of the prosecution of this study not in this or in any one country alone, but in all countries and under every condition and climate, is happily set forth in the device and the legend selected as the badge and motto of the Society, to wit, the round globe as the theatre of its labours, and the significant words, *venienti occurrite morbo*, pointing clearly to the grand end and aim of our work—the anticipating and, to the utmost of our power, averting or arresting the course of disease, rather than the seeking to mitigate or heal the effects

of the evil when it has once appeared. This latter task is taken up and carried out by other medical societies, the chief and predominant idea of whose labours is the cure of sickness and the relief of suffering. The charter (1834) of the Royal Medical and Chirurgical Society, for example, expressly states that it was founded for "the cultivation and promotion of medicine and surgery and the branches of science connected therewith," and the society adopted for its cognisance the classic design, from an ancient Roman medal in the British Museum, of a figure of Hygeia or the Goddess of Health, and that of a man on his knees imploring relief, with the appropriate motto "*non est vivere, sed valere vitâ.*" Thus, in the words of our programme paper, "while the chief object of the other medical societies of the metropolis is the investigation of the physiological, pathological, and therapeutic relations of diseases, that of the Epidemiological is specially the study of their etiological or causal relations, and the influences of locality, climate and season, diet and occupation, etc., on their rise, dissemination, and continuance."

But if not anticipated in the scope of our endeavours by the medical societies of the present day in this country, the same thing cannot be said of some of the medical associations on the continent, in former days at least. For example, the Royal Society of Medicine of France—which included in its ranks not only all the eminent medical men in that country together with the leading statesmen and ministers of the day, but many of the most distinguished physicians and surgeons of other nations, such as, among our countrymen, Pringle, Cullen, the Hunters, Fothergill, Lind, and Heberden—appears to have been founded on the most comprehensive basis. It was placed in 1778 under the special favour of the young king, Louis XVI, then recently come to the throne, by a royal charter which thus adverts to its leading objects:—"The zeal with which those we have honoured with our confidence have applied themselves to carry out a plan of inquiry so well fitted to throw fresh light on the causes of epidemic diseases, by which we grieve to see our provinces at times afflicted, presages the happy aids which our people may receive from their labours, and we cannot give a more signal proof of our satisfaction to those who devote themselves to such useful inquiries, and one which may furnish new motives for encouragement, than to render permanent by our authority a society which fulfils so worthily our desires." Among the various sub-

jects enumerated as specially deserving investigation, are (besides practical medicine and surgery) accurate meteorological observations in different districts of the kingdom in connection with the prevalence of diseases, the medical topography of the provinces, and the medical chronology of the state of health in different parts of France during a succession of years. Also, such subjects as epizootics or murrains; blights and other diseases of plants; the purification and preservation of water on long voyages; the influence on public health of intramural interments, noxious trades, etc.; and lastly, reports on the diseases in colonial possessions of the kingdom.

It will thus be seen how wide was the field embraced in their inquiries, and how analogous in very many respects were the objects of the old French Royal Society of Medicine to those which we, in our humble sphere, and with no advantages save those we can earn by our own exertions and the co-operation of our brethren, endeavour to pursue.

The topographical and geographical relations of disease have always engaged much of the attention of this Society. The appointments, from the first, of Foreign and Colonial Secretaries recognised most emphatically the importance of obtaining wide and extended inquiries in different regions of the earth, and also the necessity of endeavouring to enlist the co-operation of our brethren abroad, whether resident in distant countries, or, as with the medical officers of the army and navy, visiting and temporarily sojourning in these countries. That our exertions have not been without result, I might point to the contents of the first volume of our *Transactions*, as well as to the forthcoming part I of the second one, now in the press, and which will be found to contain, besides various papers on epidemics in this country, an elaborate memoir on the successive visitations of yellow fever in Bermuda, by Dr. Smart, Deputy Inspector-General Royal Navy; an account of the epidemic diseases of Tasmania, by Dr. S. Hall of Hobarton; a paper on the remarkable outbreak of pleuro-pneumonia in our Mediterranean squadron in 1861, communicated by the Director-General of the Navy; and one on the re-vaccination of the army at home and abroad, by Dr. Bowen.

The presentation, now some years ago, of the magnificent map which adorns our walls, and wherein an endeavour has been made to indicate the course over the face of the globe of certain epidemic diseases, and the principal *habitats* of some endemic diseases, attests the marked interest which

Mr. A. Keith Johnston, who has done so much for physical geography, has long felt in our labours.

And then, need I say how much we must all feel the honour conferred on the Society by the dedication of that great work of erudition, ability, and zeal, the *Handbuch der historisch-geographischen Pathologie* by Dr. Hirsch of Berlin, "in acknowledgment of the efforts and services of the Society in promoting the science of public hygiene." Let me express an earnest hope that this most valuable and interesting work may, ere long, be made known to the English reader generally by a worthy translation, as was recommended by our Council to the Council of the New Sydenham Society a year or two ago.

[After relating various illustrations of the medical topography of Great Britain, Dr. Milroy proceeded :—]

And now, having seen how remarkable has been the diminution in the frequency of ague in England and in Scotland since the end of last century, I would pass over to Ireland and glance at some noteworthy points in the "status of disease" there, a land whose history abounds with so many instructive illustrations of the importance of studying medical topography. In doing so, I must not forget to record my sense of the great ability and extraordinary energy of Sir William Wilde, to whom the subject of vital stasistics, as well as other branches of professional inquiry, is so largely indebted. Associated with the present Registrar-General of Ireland in conducting the census of 1841 and of 1851, the bold idea occurred to him to endeavour to ascertain, with the greatest approximative accuracy, the total number of the sick and disabled, and the nature of their malady or infirmity, throughout the entire length and breadth of the land, on the day when the enumeration was taken. It was, I believe, the first attempt of the sort that had been made in this, or indeed in any other country; and, considering the novelty of the experiment, and the imperfect machinery at command, the success achieved was surprisingly great. Those who have examined the two blue books, entitled the *Reports on the Status of Disease in connection with the Census of Ireland in* 1851 *and in* 1861, well know the vast amount of interesting and instructive information on the health-state of the country they contain. To one or two points only will my limits allow me to allude.

In 1851, the amount of epidemic diseases (this class including fevers, alvine fluxes, influenza, ophthalmia, etc.), was estimated at about one in every three of the total sick. The proportion varied in different parts of the country; it

was greatest in Munster and least in Ulster. "In examining more minutely into the topographical distribution of this class of diseases, we find a remarkable difference in different localities; being greatest in the city of Kilkenny, and the counties of Clare and Kerry, the towns of Waterford and Galway, and least in the counties of Antrim, Down, Armagh, Donegal, and Dublin, and in the town of Belfast; shewing in the former instance the effects of poverty and destitution in the production and maintenance of epidemic diseases, and in the latter those of comfort, industry, and cleanliness in maintaining a comparative immunity from diseases of the epidemic or contagious character."

It is gratifying to find that ten years later, viz., in 1861, the state of the public health had decidedly much improved; the ratio of the sick to the well had fallen considerably, and the proportion of the zymotic or epidemic class of diseases to the total sick was ascertained to be only 1 to 8, whereas formerly it was as 1 to 3. The amount of fever throughout the country had greatly diminished; ophthalmia, too, was much less frequent; and there was less also of diarrhœa and dysentery. The land scurvy, which prevailed during the years of scarcity and the change in the people's food, had almost disappeared. Scrofulous disease, too, is believed to have been very sensibly less than it was ten years ago, as indicated by the considerable diminution in the number returned as cases of tubercular consumption in 1861 as compared with that of 1851. Pemphigus, a disease once very common and fatal in Ireland—known there as the "mortifying hive"—was now comparatively rare. Dropsical diseases, too, appear to have become less frequent. Sir W. Wilde in 1851 remarked,—"Of what particular maladies of the liver, heart, kidneys or lungs, the dropsical appearances in these patients were symptoms, we have no means of determining; but ascites has long been recognised as one of the most frequent disorders among that class of the population of Ireland which live chiefly on potatoes. How far the alteration of food lately introduced in this country may hereafter affect the extent of the disease, will be determined by future investigations." In 1861 he writes,—"So far as the present returns afford truthful information, and taking into account the decrease of the population since 1851, they justify the foregoing observations. This decrease in dropsy, not dependent on organic disease, may I think be in part attributed to the alteration in the diet of the great bulk of the Irish people from potatoes to Indian meal or other cereal food, as well

as the decrease in chest affections is probably owing to the acknowledged improvement in the lodging and clothing of the lower classes." That in all latitudes there is a form of dropsy frequently associated with an endemic cachexia of the system, and that this cachectic condition is the result of imperfect nutrition, coupled in many cases with exposure to a very humid atmosphere or to malarious agency, cannot be doubted. The disease, for example, appears to be very common among the natives of India and other warm and tropical countries; and it may be also worthy of remark that, according to the tables of mortality in London two centuries ago, dropsies were infinitely a more frequent cause of death in the metropolis than during the present century. Indeed, one is altogether much struck with the resemblance, in not a few particulars, of the tables of mortality in Ireland fifteen years ago with those of London in the seventeenth century.

The observations of Sir W. Wilde in respect of Ireland remind us how meagre and imperfect are our means of information as to the topographical distribution of diseases in the United Kingdom, and how little the subject has been investigated as it deserves to be, although it is obviously one of first-rate importance. That the systematic registration of the diseases occurring among large sections of the people in different districts of the country, on the plan suggested by this Society, and recently pressed on the attention of the Poor Law Board for adoption by the parochial medical officers, would lead to many useful results, cannot well be doubted. It only requires, we believe, the subject to be fairly considered by the profession generally, and to be brought before some of the leading medical associations from time to time, for some practical step to be taken in the matter. There is no lack of medical men in different parts of the kingdom who would most willingly give their aid in such a work, as was proved by the ready co-operation which Dr. Richardson met with, some years ago, in his zealous efforts to establish a registration of epidemic diseases throughout England.

Passing now from the mother country to our colonies, I must be content to select one or two only as affording illustration of the great importance of having accurate information as to their medical topography; and first, as to the Bermuda islands, which have recently again suffered so disastrously from yellow fever. This is the third visitation of the pestilence during the last twelve years. Fortunately, we

possess full particulars respecting the outbreaks in 1858 and in 1856; particulars which abundantly testify as to the local sanitary conditions which gave force and fatality to the disease among both the civil and the military populations. Again, our army and navy have suffered severely; and most earnestly is it to be hoped that a strong effort will be made to stir up the authorities in this country to take a more active interest in providing against these ever-recurring visitations of deadly sickness, in one or other of the distant possessions of the empire. The War-office, it is understood, has ordered a searching inquiry into the history of the recent epidemic.

At the opposite extremity of the globe, there is another colony, whose medical history has been the subject of painful public interest on more occasions than one, during the last three-and-twenty years that it has been in British occupation. The losses of life from malarial disease among the civil residents in and around the new town of Victoria, as well as among the troops stationed on the island, were truly dreadful for the first few years of the settlement. Gradually, however, the health-condition of the civil population very sensibly improved; and, from the latest published report of the Governor to the Colonial Office, it would appear that the public health of Hong-Kong has become much more satisfactory. Respecting 1862, he remarks that, "as the three previous years have been almost as healthy as the present one, we may perhaps venture to anticipate that the improvement may be permanent"; and he quotes, from the annual report of the colonial surgeon, the opinion of that officer that this improvement has been the result of the numerous sanitary measures which have been carried out.*

Unhappily, the returns from the army are anything but so encouraging. The amount of fevers and fluxes among most of the troops on the island continues to be excessive, and leads every year to heavy losses by death and invaliding. That the site of many of the barracks is faulty, and their sanitary condition defective, is quite manifest. The exposure, too, of the men on night duty is a fruitful source

* It is to be regretted that the Colonial Office have not printed in full the report of the medical officer, although the governor expressly calls attention to its importance. Our Society might, I think, do a most useful act, if we were to memorialise the Colonial Secretary of State on the great benefits that would result to sanitary science, and to the welfare of the colonies, if more ample information as to the health-state of each colony were regularly given in the Blue Books on the past and present state of Her Majesty's colonial possessions, which are annually presented to Parliament.

of sickness, as appears from the comparative immunity of those who are not thus exposed, as the band, orderlies, prisoners, etc.

But of all the fields for the pursuit of medical topography abroad, none can compete in extent, variety, and importance with that of India; that mighty country, from Point de Galle to the Himalayas, with its teeming population of 150,000,000, under every imaginable diversity of locality, climate, and condition of life; and, what adds not a little to the interest, a country whose people is among the earliest of the human family, and one too which, there seems reason to believe, has been the birthplace of more than one disease that has subsequently spread, more or less extensively, over the rest of the world. The present time is singularly favourable for making a beginning in the work of endeavouring to establish a systematic topographical survey of different districts and regions, and a synchronous record of the most prevalent epidemic diseases in each division of the country. The recent publication of the East India Sanitary Report has given a stimulus to inquiry; and the numerous valuable topographical papers in the *Transactions* of the different Presidential Societies, and also in the recent Annual Reports of the Army, attest the interest felt in such investigations. It needs but that some general and uniform plan be followed out by the large staff of medical officers, military and civil, dispersed over every region of that vast country, to insure the most valuable results to science. The existing twofold and uncombined system of medical returns, part being sent to the Medical Department of the Army in this country, and part to the medical inspectors at the different Presidencies, is a serious impediment to scientific usefulness; for a considerable portion of the evidence respecting the health of our large military force—indeed, the whole of it relating to the native army—is thus never brought before the public in this country, and we are left without much information of the very highest importance.

From the topography, I will now glance at the geography of diseases. Geographical medicine presents various aspects for study. There is, for example, the range and distribution in different lands of certain special endemic maladies, such as goître, leprosy, pellagra, etc., just as there is the range and distribution of certain vegetable and animal tribes, to be investigated—a most interesting field of research. The geographical diffusion of most epidemic diseases, too, stands much in need of more accurate determination

than we are yet in possession of. Take the case of our ordinary continued fevers, typhus and typhoid, and we find it difficult to say with confidence, in the present state of our knowledge, in what parts of the world, especially out of Europe, the former is liable to occur; and, with respect to the latter, it is only of recent years that its existence has been clearly shewn to be common in India and other regions of Asia, as well as in the West Indies and South America. The same uncertainty prevails as to the limits of extension in regard to several of the exanthemata. Small-pox, the worst and most formidable of all, unhappily seems to have penetrated almost everywhere, with the sole exception, on a large scale, of the Australian continent and the adjacent islands. Whether this exemption has been altogether due to the adoption of prophylactic measures, including that of vaccination, is a question of the highest interest to public hygiene. Next to small-pox, measles is perhaps the most widely disseminated. Scarlatina is certainly less extensively diffused than either measles or whooping-cough. Its extreme rarity in India (if, indeed, it occurs there at all) is a striking feature in its history. Then, too, how curious is the geographical as well as the chronological history of diphtheria during the last few years, as far as our imperfect information enables us to judge! To what extent it has been diffused over Europe, I am uncertain; but we know that it has extended over a large portion of the globe, cases having been met in Nova Scotia and various parts of the North American continent on the one hand, and at the Cape of Good Hope, and in Australia and New Zealand on the other. It has been stated that the disease existed in Iceland in 1856, '57, and '58.

The wider diffusion of yellow fever, in respect both of geographical extension and of the elevation above the sea level at which it has been met with during the last fifteen years, is worthy to be noted. There is much in the natural history of this malignant fever that is curious and perplexing. Why, for example, should its birthplace be limited, as generally believed, to one part only of the West African coast, and to the shores of the Caribbean gulf and of the included islands, and why is it not developed on the eastern coast of the African continent, and in other regions of the Pacific, which seem to present the same conditions of climate, physical configuration, etc., as those of its ordinary *habitats?*

But of all pestilences, epidemic cholera is the most interesting to the epidemiological inquirer. Its career during

the last thirty-five years, since it overleaped the limits within which it had previously abode, and spread eastwards and westwards over the face of the globe, is a remarkable event in the history of the world. The only great regions to which it has not penetrated seem to be Australia and its islands, the southern extremity of Africa, including the Cape of Good Hope and Natal, and the southern extremity and also the western coast of South America.

But it is not only in respect of the extremely wide diffusion of the disease that the geography of epidemic cholera is so interesting, but also in respect of the traceable course or career of its march, step by step, in successive visitations, from its home in the east until it has at length girdled the earth with a broad gloomy belt of suffering and of death. That it has often appeared to be devious and irregular in its course during its great migratory movements, only adds to the interest of the subject, and serves to suggest to the epidemiological inquirer the extreme desirableness of far more complete and accurate intelligence about its manifestations in different lands and countries than has hitherto been obtained. At present our information is at best fragmentary and imperfect; and, moreover, little has been done by our countrymen to gather together and arrange the short notices and records of these manifestations scattered in the fugitive journalism of the day. No country in the world possesses such extensive opportunities for the observation and notation of all natural phenomena as Great Britain, in consequence not only of her numerous colonial possessions, but of her wide-spread consular machinery, whereby almos every foreign land is brought within the regular cognisance of the government. Let us hope that, ere long, advantage will be taken of these manifold channels of intelligence to promote the objects which this Society has so much at heart. What light, for example, would be thrown on the epidemiology of cholera if we had accurate information as to the exact period of the manifestation of the disease in different districts of an extensive region, and in the different countries of an entire continent, during an epidemic season! Obviously it is only in this way that we can ascertain whether the invasions were synchronous, or whether they were consecutive; and, if the latter, what interval elapsed between the outbreaks. Such knowledge would aid materially in determining the solution of various problems of scientific and practical interest, which are still among the vexed questions of the day.

NOTE ON DIPHTHERIA IN PERU.

By Dr. ARCHIBALD SMITH.

[*Read November 7th*, 1864.]

According to *Hay's American Journal*, diphtheria appeared for the first time in Lima in 1821, and afterwards to a limited extent in 1850 and 1851. In the Peruvian autumn, which corresponds to our spring months, I distinctly remember having attended a case of diphtheria, in a youth of the name of Cucalon, in consultation with the late Dr. Solari of Lima, a most able and deservedly popular Italian physician, as far back as the year 1848; but in 1850 I do not recollect to have seen any case of it in my own private practice, which was very extensive at that time in Peru. Of 1853 I cannot speak, as I was then in this country. But in 1858 and 1859 this cruel throat disease prevailed, and most fatally among children.

The late Dr. D. Jose Manuel Valdes is the only authority, as far as I know, now extant on the epidemics of Lima in 1821; and among these he describes in a memoir published by him in Lima in 1827, a malignant ulcerated sore throat,—"angina ulcerosa maligna,"—which the reporter in *Hay's American Journal* may have probably characterised as diphtheria. Whether the disease described by Dr. Valdes as a malignant ulcerated angina, be properly speaking diphtheria or not, each may judge for himself when I here translate, from the original Spanish, the learned Dr. Jose Manuel Valdes' own description of the malady. He writes:—

"Although the character of this 'angina' may have been the same with other cases described in different parts of Europe by various practitioners, its history shows that it has been less malignant than in other places. The (attendant) fever, which was commonly of a putrid or adynamic sort, participated, in certain persons with vigorous constitutions, of the inflammatory nature. It was very rare among male adults, and I have no notice that any old man ever suffered from it. The ulcer showed itself from the first to the second day of the disease in the tonsils and in the uvula, or upon the *velum pendulum palati*, or on all

these parts together, at one and the same time. Its colour, at first white, afterwards changed to a brownish grey (*cinicionto*) but never became black; nor did the ulcers exude a putrid and fetid sanes.

"It was of the best omen when whitish and coriaceous eschars separated themselves from the ulcers, and they never left behind sordid and sinuous ulcerated surfaces, but merely slight excoriations which soon disappeared. No one died of the progress of gangrene, nor from the character of the fever, but only from actual suffocation; because the ulcers spreading to the larynx and pharynx entirely impeded respiration and deglutition. Nevertheless, the malady was eminently contagious, and its fatal termination usually occurred between the third and seventh day, after which time the danger diminished."

As, according to Dr. D. J. M. Valdes, no essential difference was observed by which to distinguish the epidemic angina observed in Europe, and especially in Spain, from that in Lima, Dr. Valdes adopted the Spanish mode of treatment, in omitting all use of tartar emetic, and trusting to the chinchona bark (*la quina*) as the most powerful remedy against this dreadful and acute disease. He used it not only inwardly, but outwardly as a gargle; he also used sinapisms, or bread softened in vinegar and water, to the neck with good effect, and applied to the ulcers a mixture of syrup of roses with either the sulphuric or muriatic acid. When the angina was attended with decidedly inflammatory symptoms he bled freely; when the pulse indicated great debility, Dr. Valdes gave the *quina* in large and frequently repeated doses, and with the most perfect success when it was taken in proper time.

During 1821 Lima suffered all the privations and trials of a siege while occupied by the royalist army; consequently, its inhabitants were afflicted with simple gastric and bilious fever, as well as contagious adynamic and ataxic fever, with epidemic cholera morbus, measles, and intermittents of a severe and pernicious type.

ON A CASE OF PRESUMED "DELHI BOIL."

By FRED. J. BURGE, M.R.C.S.E.

[*Read December 5th*, 1864.]

The disease which I desire to enlist the attention of the Members to this evening is one reported to be at present endemic at Delhi in India alone; but I am not aware whether any instances are recorded of its treatment in this country. Its study, however, may not be unprofitable since, as cholera and other diseases, which in former times were considered of truly eastern character, have made their advent in western climes, so may the Delhi plague (now isolated as it were within a narrowed limit) sometime enlarge its bounds and travel towards us.

Dr. Frazer, in a report published in the *Statistical, Sanitary, and Medical Reports* of the Army Medical Department for 1860, p. 452, describes this malady under the title of the "Delhi Boil," the name by which it is known to Europeans in India.

I am sorry I can claim no special practical knowledge of the diseases of India, and therefore cannot attempt to throw any light upon the subject, but my object will be gained by bringing it under the notice of the Society.

The case to which I allude is that of a child, now two years old, born on "the Hills" in India. When twelve months old (Dec. 1863) and previously healthy, this child was brought through Delhi to Calcutta, sojourning a fortnight in the former city. The disease first appeared at Calcutta whilst staying there *en route* for England; it commenced, according to the report of the mother, on the forehead and fore part of the head in patches, bearing the appearance as if scalding water had been applied to the skin on the part affected. These continued spreading and inflamed through the voyage, but did not suppurate until arrival in England in May 1864. Several other cases occurred amongst the troops and children on board.

Measles of a favourable character prevailed, and one man is reported to have been cured of the Delhi disease by an attack of this complaint. The child, however, to which

these remarks have reference, had a slight measly attack without any influence on the Delhi boil.

With reference to any constitutional taint it will be interesting to observe that the father is about thirty-five or forty years of age, of good stature and muscular framework, a quarter-master in the army, and had been resident in India with his regiment six years. He passed through Delhi to his station, and was afterwards attacked with this disease. He had been with the army in the Crimea all through the Russian war, and previous to the attack after going through Delhi had enjoyed uninterrupted good health.

The mother, of spare but apparently healthy constitution, of about thirty or thirty-five years of age, also enjoyed good general health, and passed through Delhi with her husband and children, but was not affected by the disease. She was pregnant at the time. Has three children; the oldest about four years of age, born in India and healthy, passed through Delhi with the parents, but was not affected with the disease. The second child is the subject of this case. The youngest child was born on passage home from India about February, 1864. Neither the eldest or youngest child nor the mother have been attacked although in close communication daily with the affected child. A second attack of the disease appeared in the father on the voyage home, and he is still suffering from it. He had spent the last six months in Delhi previous to sailing for England. Latterly the disease has reappeared about the knee and leg.

In July, 1864, when the case first came under my notice, the forehead and fore part of the head were much tumefied and reddened. Large patches of ulceration, covered with scabs, existed, accompanied by considerable pain. The scabs were of an irregular shape, of a brownish yellow colour, and depressed somewhat in the centre. The edges of the scabs were slightly raised, showing an ulcerated surface underneath. The edges of the ulcers were also raised and indurated, and in some the excavation appeared considerable. The whole scalp on the fore part of the head was raised, as if a large amount of suppuration had taken place underneath, though it was doughy to the touch. The general symptoms pourtrayed depraved secretions, the tongue white, and bowels irregular. From the end of July to a very recent date, this case has not been under my immediate cognisance, but at this moment (Dec. 3rd, 1864) the disease is still uncured.

The present condition may be briefly described: the fore-

head presents the appearance of recent cicatrices, but is covered with dry scabs with ulcerating surfaces underneath. The surface of the skin is red, and there is evidently much pain and irritation or itching. Lately the *urine* has been very pale and excessive in quantity, though the child does not bear a depressed appearance, and, were it not for the eruption, would even pass for healthy. I have felt it necessary to dwell more on the symptoms and conditions of this case than is usually necessary for discussion in this Society for the purpose of connecting it,

1st. With the peculiar endemic disease known as the "Delhi boil;" and

2nd. With regard to the subject of contagion.

In relation to skin diseases incidental to Britain, its general characters were more allied to rupia than any other. Apparently a somewhat kindred malady is known in Eastern parts as the "Aleppo evil," but this appears to be confined to the valleys of the Tigris and Euphrates, and assumes more of a tubercular character with blackened crusts. It is also said to occur only once during life. Both maladies, however, are supposed to arise from similar exciting causes. The general condition of the parents and child, the non-existence of throat affection in either, the absence of any purple colouring in the parts affected, argue against a syphilitic taint, which might have been suspected. The purulent and non-vesicular character of the eruption, with the concomitant circumstances, and the refractory nature of the complaint, tend to separate it from rupia; whilst, with regard to *contagion*, it may be urged that as the two other children of the family have had unrestricted, and indeed almost careless intercourse with the diseased one, yet after many months they appear perfectly free from the disease. The reported prophylactic action of measles, though a circumstance not much to be relied on, is yet a subject worthy of some inquiry.

ON THE PREVALENCE, DISTRIBUTION, AND LIMITATION OF SCARLET FEVER IN ENGLAND.

By J. NETTEN RADCLIFFE.

[*Read December 5th*, 1864.]

I am wishful to provoke a discussion concerning the limitation of scarlet fever. To this end I propose to show (as far as this may be done by the Registrar-General's mortuary records) the extent to which the disease prevails, and its distribution in England. I shall offer also some remarks on the limitation of the malady.

I. *Prevalence.*—The Registrar-General's returns of scarlet fever, for the whole of England, include two periods of five and sixteen years respectively. The first period extends from 1838 to 1842, and the second from 1847 to 1862, inclusive. The total number of deaths registered from the disease in the twenty-one years was 310,720; the annual average mortality for the whole series of years was 14,796. If a comparison be instituted between quinquenniums, it is found that, in the first (1838-42), the average yearly mortality was 12,582; in the second (1847-51), it was 15,065; in the third (1852-56), 16,720; in the fourth (1857-61), 14,089. Or, to make a more accurate comparison, in the first quinquennium the yearly average mortality per 100,000 population, living at all ages, was 81; in the second quinquennium, 84; in the third, 89; and in the fourth, 74.

It is thus seen that, in the second and third periods, there was a great increase in the mortality from scarlet fever; in the fourth period a considerable falling off. The relationship of this decrease to the outbreak of diphtheria is of peculiar interest, as will presently be seen.

Four times in the twenty-one years scarlet fever was epidemic. The annual average mortality, per 100,000 population, during the whole period, was 82. The first epidemic occurred in 1840, when the death-rate reached 128—the highest mortality which took place from the disease in the twenty-one years. In the year following (1841) the mortality was above the average. The second epidemic occurred

in 1848, when the death-rate was 118. In the year previous the mortality had risen slightly above the average. The third epidemic occurred in 1852, when the death-rate reached 103. In the three following years, 1854, 1855, 1856, the mortality continued above the average. The fourth epidemic occurred in 1858, when the death-rate was 121—the highest which had happened since 1840. In the year following (1859) the mortality averaged 97 per 100,000 population.

Diphtheria became epidemic in 1858, the year of the fourth epidemic outbreak of scarlet fever. In 1859 the epidemic of diphtheria reached its maximum, scarlet fever still being more than ordinarily prevalent. In 1860 diphtheria continued epidemic, but scarlet fever had become comparatively little prevalent, or its fatality had decreased so greatly that the mortality from this cause was less than half that which occurred in 1859. In 1861 the mortality from diphtheria exceeded that of the first year when the disease became epidemic, while the mortality from scarlet fever was but little more than half the usual average. In 1862 the mortality from diphtheria still continuing high, that from scarlet fever had increased to a tenth below the annual average. In 1838 the mortality from scarlet fever averaged 39 per 100,000 population; in 1860, 46; and in 1861, 45. These are the three years of lowest mortality from the disease recorded.

The outbreak of diphtheria contemporaneously with one of the greatest epidemics of scarlet fever which has prevailed in England, and the subsequent declension of scarlet fever contemporaneously with the apparent naturalisation (so to speak) of diphtheria among the population, are facts of great interest. Scarlet fever has prevailed epidemically at the same time as diphtheria in other countries, but facts are still wanting which would enable us to explain the concurrent prevalence of the two disorders. It is probable, however, that the fluctuations of scarlet fever from 1857 to 1862 are not greater than those which have hitherto been observed in the progress of the disease. In other words, it is probable that the diminution of the disorder in 1860-61-62 is but a transitory phenomenon, having no necessary, or even intimate, connection with the existence of diphtheria. In 1858 scarlet fever was more fatal and prevalent in London than it had been in any year since the weekly bills of mortality had become trustworthy. In 1860 the deaths from the disease fell below the average. In 1861 the

malady again became epidemic in the metropolis, and in 1862 the mortality from it was, with the exception of the epidemic of 1840, the greatest which has ever been recorded from this cause within the bills of mortality. It is far from improbable that scarlet fever was excessively virulent throughout England during 1863.

The history of the progress of scarlet fever in the metropolis differs from that of the entire kingdom in this, that it shows a great augmentation of the mortality from the disease in the last quarter of a century. The annual average mortality from the malady in London during the past twenty-six years was 83 per 100,000 population. The average varied from 32 in 1841 to no less than 174 in 1863. In the quinquennium 1839-43 the annual average was 78; in the quinquennium 1844-48 it increased to 88; in the quinquennium 1859-63 it advanced to 115. The death-rate of 1863 (174) was more than double the annual average of the twenty-six years 1838-64.

Scarlet fever was epidemic in London in 1839-40; 1848 (when the death-rate reached 212, nearly twice the annual average), 1852, 1854-55, 1858-59, and 1862-63. In fact the disease was epidemic in London at the same time as throughout the entire kingdom, except in 1862. In that year the mortality throughout the country was much larger than in 1861. It remains to be seen whether the parallel holds good of 1863.*

2. *Distribution.*—Our knowledge of the distribution of scarlet fever in England is derived from an important return prepared by the Registrar-General, and submitted to Parliament in the course of the last session. This return shows the average annual proportion of deaths from certain specified diseases, and among others, scarlet fever, in England generally, and in each registration district during the decennial period 1851-60. The return shows the proportion of deaths per 100,000 population, at all ages, and at less than five years of age.

The annual average mortality from scarlet fever in England and Wales, in the period referred to, at all ages, was 88; at less than 5 years of age, 419. Scarlet fever is almost as fatal as the entire class of fevers† summed up by the Registrar-General under the generic term "typhus." In four of the eleven great registration divisions only is the mortality from

[* The deaths registered from scarlet fever in England and Wales during 1863 numbered 30,475, being at the rate of 148 per 100,000 population—the greatest mortality recorded.—J. N. R.]

† 91 per 100,000 living at all ages.

scarlet fever above the average, namely, *London* (average, 94; less than 5 years, 488); the *North-Western Counties* (Cheshire and Lancashire; average, 129; less than 5 years, 644); *Yorkshire* (average 102; less than 5 years, 488), and the *Northern Counties* (Durham, Northumberland, Cumberland, Westmoreland; average, 107; at less than 5 years, 510). It is noteworthy that in Yorkshire alone, of the above four divisions, did the mortality from diphtheria exceed the average of the kingdom.

The lowest average mortality from scarlet fever (53; under 5 years of age, 230) occurred in the South Midland division (Middlesex, *extra-metropolitan*, Herts, Bucks, Oxford, Notts, Huntingdon, Bedford, and Cambridge); the highest in the North-Western division.

It is a significant fact that the divisions of maximum mortality include, in addition to London, the great northern and western mining and manufacturing counties. Among the closely-packed populations of the metropolis, and of the crowded manufacturing and mining districts, the ravages of scarlet fever are greatest. This is not a new fact. In the seven years, 1838-39-40-41-42-47-48, the mortality from the disease was also in excess in those divisions as compared with the rest of the kingdom. Whatever be the cause of an aggravated death-rate from scarlet fever in London and the north-western and northern counties, it is not of recent date. The source of the persistence of an excessive mortality from scarlet fever, in these divisions, cannot at present be satisfactorily elucidated. The whole of the statistical data necessary for the investigation of this question have not as yet been published.

The mortality from the disease, in the different registration districts, ranges from 0 in the Scilly Isles to a maximum of 187 of all ages, and to 870 at less than 5 years of age, in Bolton, Lancashire. Although no deaths from scarlet fever were recorded in the Scilly Isles during the last ten years 1851-60, the disease is not unknown there. Mr. Moyle, of Scilly, has recently stated that scarlet fever has often prevailed in the islands, but in so mild a form that it has not caused a death for at least fifteen years. The Scilly Isles have a population of 2,431.

The lowest mortality from scarlet fever occurred in the Andover district, Hampshire (population, 17,132). In this district the annual average of deaths from the disease, at all ages, was 10; at less than 5 years of age, 37.

Other districts of low death-rate from the malady are:—

	Population.	Av. at all Ages.	Av. at less than 5 Years of Age.
Ware, Herts	16,515	13	73
Swaffham, Norfolk . .	13,747	13	38
Shepton Mallet, Somerset .	16,619	15	66
Horsham, Sussex . . .	15,313	17	51
Chipping Sodom, Gloucester .	18,763	18	80
Bedale, Yorks. N.R. . .	8,650	18	70
Leyburn, do.	10,105	20	61

The number of Registration Districts in England and Wales amounts to 623. The mortality from scarlet fever at all ages was above the average of the kingdom in 169 of these districts; at less than 5 years of age, in 160.

A knowledge of the distribution of the districts of highest mortality is of the greatest moment in reference to the limitation of the disease. Such knowledge was not practicable until the publication of the return from which the facts I am dealing with are mainly taken. The localisation of the maximum mortality from, and (so far as the mortality may be taken as a gauge) prevalence of, the disease in certain restricted centres, gives a reasonable hope that the limitation of the malady is not beyond the reach of preventive medicine. It leads also to the probability that these centres are the constant sources of scarlatinal infection in the kingdom; and it may be assumed that the principal efforts of prevention should, in the first instance, be applied to them. The localities demanding special means of prevention being thus limited, the whole question of the public measures for the restriction of scarlet fever assumes less formidable and more manageable dimensions. It is known that often large tracts of country are free from the disease. Once let it be determined that there are constant foci of scarlatinal infection, and half the battle of preventive medicine is won.

The following is a brief summary of the distribution of the districts of excessive mortality from scarlet fever:—

	No. of Registration Districts.	No. of Registration Districts in which the mortality from scarlet fever is in excess. At all Ages.	At less than 5 Years of Age.
London	36	23 [1]	27
Durham	13	9 [2]	8

1. *At all ages*—Chelsea, St. George (Hanover Square), Pancras, Islington (where the Fever Hospital is situated), Hackney, Holborn, Clerkenwell, St. Luke, East London, West London, Shoreditch, Bethnal Green, Whitechapel, St. George-in-the-East, Stepney and Mile-end Old Town, Poplar, St. Saviour (Southwark), St. Olave, do., Bermondsey, St. George (Southwark), Paddington, Lambeth, Rotherhithe, Greenwich. *At less than 5 years of age.*—The same, with the addition of the Strand, Marylebone, Hampstead, and St. Giles.

2. *At all ages.*—Auckland, Weardale, Durham, Darlington, Houghton-le-

	No. of Registration Districts.	No. of Registration Districts in which the mortality from scarlet fever is in excess. At all Ages.	At less than 5 Years of Age.
Northumberland	12	7 [3]	7
Cumberland	9	3 [4]	3
Westmorland	3	0	0
Lancashire	26	25 [5]	24
Yorkshire :—			
West Riding	31	21 [6]	20
East Riding	10	1 [7]	2
North Riding	15	1 [8]	0
Cheshire	9	6 [9]	7
Flint	1	1	1
Denbigh	4	3 [10]	2
Carnarvon	4	3 [11]	2
Stafford	16	9 [12]	8
Derby	8	3 [13]	2
Notts	9	2 [14]	3
Pembroke	3	3 [15]	2
Cardigan	6	1 [16]	0
Brecknock	4	3 [17]	2
Monmouth	5	4 [18]	2

Spring, Chester-le-Street, Sunderland, South Shields, Gateshead. *At less than 5 years.*—The same, except Weardale.

3. *At all ages.*—Newcastle-on-Tyne, Tynemouth, Castle Ward, Morpeth, Belford, Berwick-on-Tweed, Glendale. *At less than 5 years.*—The same districts.

4. *At all ages.*—Carlisle, Cockermouth, Whitehaven. *At less than 5 years.*—The same districts.

5. *At all ages.*—Every district except Ormskirk. *At less than 5 years.*—Every district except Ormskirk and Ulverstone.

6. *At all ages.*—Settle, Skipton, Great Ouseburn, Otley, Keighley, Saddleworth, Huddersfield, Halifax, Bradford, Hunslet, Leeds, Dewsbury, Wakefield, Pontefract, Barnsley, Wortley, Ecclesall Bierlow, Sheffield, Rotherham, Thorne, Tadcaster. *At less than 5 years.*—The same except Tadcaster.

7. *At all ages.*—Hull. *At less than 5 years.*—Hull, Bridlington.

8. *At all ages.*—Guisborough.

9. *At all ages.*—Stockport, Runcorn, Northwich, Congleton, Nantwich, Wirral. *At less than 5 years.*—The same with Macclesfield.

10. *At all ages.*—Wrexham, St. Asaph, Tamworth. *At less than 5 years.*—Wrexham, St. Asaph.

11. *At all ages.*—Pwllheli, Carnarvon, Conway. *At less than 5 years.*—Carnarvon, Conway.

12. *At all ages.*—Newcastle-under-Lyne, Wolstanton, Stoke-upon-Trent, Leek, Tamworth, Lichfield, Wolverhampton, Walsall, Dudley. *At less than 5 years.*—The same, with the exception of Tamworth.

13. *At all ages.*—Derby, Chesterfield, Hayfield. *At less than 5 years.*—Derby, Hayfield.

14. *At all ages.*—Radford, Newark. *At less than 5 years.*—The same with Nottingham.

15. *At all ages.*—The three districts comprising the county. *At less than 5 years.*—Narberth and Haverfordwest.

16. *At all ages.*—Cardigan.

17. *At all ages.*—Builth, Crickhowell, Hay. *At less than 5 years.*—Builth, Crickhowell.

18. *At all ages.*—Chepstow, Monmouth, Abergavenny, Pontypool. *At less than 5 years.*—Abergavenny, Pontypool.

	No. of Registration Districts.	No. of Registration Districts in which the mortality from scarlet fever is in excess. At all ages.	At less than 5 Years of Age.
Surrey (extra metrop.)	12	0	0
Kent do.	26	1 [19]	2
Sussex	20	1	0
Hants	25	4 [20]	3
Berkshire	12	1 [21]	0
Middlesex	6	0	0
Herts	10	0	0
Bucks	7	0	0
Oxford	9	0	0
Northampton	12	0	0
Huntingdon	3	0	0
Bedfordshire	6	0	0
Cambridge	9	0	0
Essex	17	1 [22]	0
Suffolk	17	1 [23]	0
Norfolk	22	5 [24]	2
Wilts	18	0	0
Dorset	11	3 [25]	2
Devon	20	7 [26]	8
Cornwall	14	6 [27]	4
Somerset	17	1 [28]	1
Gloucester	17	4 [29]	4
Hereford	6	0	0
Shropshire	16	1 [30]	1
Worcester	11	0	0
Warwick	14	2 [31]	3
Leicester	11	2 [32]	3
Rutland	2	0	0

19. *At all ages.*—Romney Marsh. *At less than 5 years.*—The same with Dover.

20. *At all ages.*—Portsea Island, Alverstoke, Fordingbridge, Southampton. *At less than 5 years.*—The same, with the exception of Fordingbridge.

21. *At all ages.*—Hungerford.

22. *At all ages.*—Maldon.

23. *At all ages.*—Mutford.

24. *At all ages.*—Yarmouth, Flegg, Tunstead, Forehoe, Blofield. *At less than 5 years.*—Yarmouth, Flegg.

25. *At all ages.*—Weymouth, Beaminster, Bridport. *At less than 5 years.*—Bridport, Weymouth.

26. *At all ages.*—Kingsbridge, Plympton St. Mary, Plymouth, East Stonehouse, Stoke Damerel, Tavistock, Bideford. *At less than 5 years.*—The same with Exeter.

27. *At all ages.*—Camelford, Launceston, St. Germans, Liskeard, St. Austell, Helston. *At less than 5 years.*—Camelford, St. Germans, Liskeard, Helston.

28. *At all ages, and at less than 5 years.*—Bedminster.

29. *At all ages, and at less than 5 years.*—Bristol, Clifton, Wheatenhurst, Stroud.

30. *At all ages, and at less than 5 years.*—Newport.

31. *At all ages.*—Birmingham, Aston. *At less than 5 years of age.*—The same with Coventry.

32. *At all ages.*—Ashby-de-la-Zouch, Leicester. *At less than 5 years of age.*—The same with Blaby.

	No. of Registration Districts.	No. of Registration Districts in which the mortality from scarlet fever is in excess. At all Ages.	At less than 5 Years of Age.
Lincoln	14	4 [33]	4
Glamorganshire	6	1 [34]	2
Carmarthen	4	1 [35]	1
Radnor	3	0	0
Montgomery	4	0	0
Merioneth	4	2 [36]	1
Aylesbury	1	1	0

33. *At all ages, and at less than 5 years of age.*—Stamford, Holbeach, Grantham, Lincoln.

34. *At all ages.*—Merthyr-Tydvil. *At less than 5 years of age.*—The same with Gower.

35. *At all ages and at less than 5 years.*—Carmarthen.

36. *At all ages.*—Corwen and Festiniog. *At less than 5 years.*—Festiniog.

The paucity of centres of excessive mortality in the counties adjoining the metropolis is remarkable.

The most remarkable fact connected with the distribution of scarlet fever in the kingdom is, that the principal districts of excessive mortality from the disease are, as a rule, associated together in groups. These groups form larger districts of exceesive mortality, and (following an example set by Dr. Farr in respect of cholera) I propose to designate them *scarlatina fields*. The scarlatina fields are 20 in number, namely:—1. The London field; 2. The Durham and Newcastle-on-Tyne field; 3. The Berwick-upon-Tweed field; 4. The Carlisle field; 5. The North Western and West Riding (Yorkshire) field; 6. The Lincoln field; 7. The Stoke-upon-Trent field; 8. The Wolverhampton field; 9. The Birmingham field; 10. The Bristol field; 11. The Wheatenhurst field (Gloucestershire); 12. The Flint field; 13. The St. Asaph field; 14. The Carnarvon field; 15. The Pembroke field; 16. The Abergavenny field; 17. The Yarmouth field; 18. The Bridport field; 19. The Plymouth field; 20. The Liskeard field.

The London scarlatina field includes the metropolitan registration division. The mortality from scarlet fever in 23 of its 36 districts, as well as in the whole division, is above the average. It would be a useless refinement to separate the districts of minimum from those of maximum mortality, as all are contiguous and included in the metropolitan area.* The North-Western and West-Riding (Yorkshire) field in-

* The districts of minimum mortality from scarlet fever in the metropolis are: Kensington; St. George, Hanover Square; St. Martin-in-the-Fields; St. James's, Westminster; Marylebone; Hampstead; Hackney; St. Giles; Strand (average 88); London City; Wandsworth; Camberwell; Lewisham.

cludes the whole of the registration districts of Lancashire and Cheshire with the exception of four (Ormskirk, Macclesfield, Altrincham, and Great Boughton, Chester), and 21 out of 31 districts of the West-Riding of Yorkshire. The districts of the greatest mortality in the West-Riding are conterminous with the Lancashire districts; hence they form in conjunction with the districts of the North-Western counties one vast scarlatina field. This being premised the formation of the scarlatina fields is as follows:—

	Population.	Average Mortality. At all Ages.	Average Mortality. At less than 5 Years of Age.
1. *The London Scarlatina Field.*			
London	2,803,989	94	488
2. *The Durham and Newcastle-upon-Tyne Scarlatina Field.*			
Weardale	16,418	99	417
Durham	70,274	136	624
Easington	27,293	157	678
Houghton-le-Spring	21,773	93	450
Chester-le-street	27,660	140	640
Sunderland	90,704	117	603
South Shields	44,849	161	737
Gateshead	59,409	134	614
Newcastle-upon-Tyne	110,968	108	563
Tynemouth	77,955	153	750
Castle-Ward	14,943	92	501
3. *The Berwick-upon-Tweed Scarlatina Field.*			
Belford	6,260	90	479
Berwick-upon-Tweed	21,862	120	567
Glendale	13,212	108	537
4. *The Carlisle Scarlatina Field.*			
Carlisle	44,820	123	606
Cockermouth	41,292	136	591
Whitehaven	39,950	113	539
5. *The North-Western and West-Riding (York) Scarlatina Field.*			
Lancashire and Cheshire	2,935,540	129	644
West Riding of Yorkshire	1,507,796	98	454
6. *The Lincoln Scarlatina Field.*			
Holbeach	18,402	125	472
Sleaford	24,914	91	363
Grantham	28,886	110	493
Lincoln	47,063	114	481
7. *The Stoke-upon-Trent Scarlatina Field.*			
Newcastle-under-Lyme	24,567	132	573
Wolstanton	54,356	144	664
Stoke-upon-Trent	71,308	156	726
Leek	24,806	198	717
8. *The Wolverhampton Scarlatina Field.*			
Wolverhampton	126,902	106	520
Walsall	59,908	111	534
Dudley	130,267	106	482

9. *The Birmingham Scarlatina Field.*

	Population.	Average Mortality. At all Ages.	At less than 5 Years of Age.
Birmingham	212,621	106	522
Aston	105,522	98	438

10. *The Bristol Scarlatina Field.*

Bristol	66,027	99	590
Clifton	94,687	89	510

11. *The Wheatenhurst (Gloucestershire) Scarlatina Field.*

Wheatenhurst	7,813	120	528
Stroud	36,448	91	438

12. *The Flint Scarlatina Field.*

Holywell	39,941	128	574

13. *The St. Asaph Scarlatina Field.*

Wrexham	41,975	105	488
St. Asaph	27,518	112	523
Llanrwst	12,770	105	370

14. *The Carnarvon Scarlatina Field.*

Pwllheli	20,908	90	346
Carnarvon	32,425	113	490
Conway	13,396	126	529

15. *The Pembroke Scarlatina Field.*

Narberth	21,344	103	422
Pembroke	29,003	92	400
Haverfordwest	37,343	109	492

16. *The Abergavenny Field.*

Chepstow	17,941	89	356
Monmouth	30,244	96	394
Abergavenny	67,092	115	580
Pontypool	30,288	119	581

17. *The Yarmouth Scarlatina Field.*

Yarmouth	30,338	128	711
Flegg	8,631	126	478
Tunstead	14,516	112	361

18. *The Bridport Scarlatina Field.*

Beaminster	13,587	111	382
Bridport	16,828	91	478

19. *The Plymouth Scarlatina Field.*

Kingsbridge	19,394	91	467
Plympton St. Mary	20,502	93	476
Plymouth	62,599	118	669
East Stonehouse	14,343	109	537
Stoke Damerel	50,440	98	559
Tavistock	35,265	105	437

20. *The Liskeard Scarlatina Field.*

Camelford	7,784	145	517
Launceston	17,005	90	301
St. Germans	17,631	97	459
Liskeard	33,562	128	553

3. *Limitation.*—I have now detailed the chief facts concerning the prevalence and distribution of scarlet fever in England. The question of limitation remains to be dealt with. The importance of this question is to be estimated mainly from the destructiveness and prevalence of the malady. The prevalence of scarlet fever, as has been seen, is, in so far as England is concerned, universal. Its destructiveness is greater than that of any other form of fever, exanthematous or continued. The limitation of the disease demands, at least, care and attention equal to that which is given to continued fevers. But it is an undoubted fact that the question of limitation does not receive either care or attention in any degree approaching to that which is given to the continued fevers or small-pox. Dr. Copland has very justly remarked* that means of protection "were more frequently advised, and more frequently adopted in former times than at present." He thinks that "the uncertain efficacy or frequent failure of these means, the hopes of escaping the more dangerous form of the malady, probably induced a want of confidence in them, of which they are not altogether deserving, especially in some circumstances in which the disease presents itself." Whatever may have been the original cause of the indisposition to adopt measures for the prevention of scarlet fever, it has exercised the most disastrous effects upon the teachings of the profession. Moreover, however just a want of confidence in the means adopted a quarter of a century ago may have been, such doubt could not be rightly persisted in when the conditions under which the disease prevailed became better known. Difficult as the effective adoption of means for the limitation of scarlet fever may be, and disheartening as the results too often are, neither the difficulty nor the discouragement is such as to warrant that almost entire avoidance or extremely imperfect treatment of the question which is, strange to say, peculiar to the principal English text-books of medicine, with one exception, perhaps, Dr. Copland's great dictionary. In these works the preventive treatment is swallowed up in, or made entirely subsidiary to the curative treatment of the disease. From such teachings it is idle to imagine that the student will enter upon the practical duties of his profession in any degree impressed with the importance of prophylactic measures. Experience, indeed, teaches us that, as a rule, no sufficient means of prevention are either advised or carried out; that the question is, indeed, treated as a secondary matter of little

* "Dic. of Pract. Medicine:" Article scarlet fever.

importance, instead of being regarded, as it should be, of primary importance. I could quote instance after instance of the painful consequences arising from this neglect. I am convinced that until the limitation of diseases receives much greater attention in our schools of medicine than is now given to the subject, preventive medicine will not, neither can it, make those advances which the public have now a right to demand from it. I am convinced also that until this is done, a large share of responsibility for the ravages of the more common epidemic diseases will rest upon the profession.

An important cause of distrust as to the efficacy of preventive measures among those members of the profession who most religiously practise them, has arisen, I believe, from a mistaken notion of the extent to which they are applicable, and of the probable results to be obtained from them. Anticipating too much, they have been too greatly disheartened. It is obvious that there are conditions under which the disease prevails in the back slums and crowded courts of great towns—

> "Those hideous streets, those graves, where men alive,
> Packed close with earthworms, burr unconsciously,
> About the plague that slew them:"

It is obvious that in these conditions none of the ordinary provisions of domestic hygiene will meet the contingency. It is obvious also that among the middle and higher classes of the population much difficulty will be experienced in obtaining that rigid attention to the needs of limitation which is absolutely required for its success. But these are difficulties which must yield to persistent action. People have to be trained by long education in the necessities for these precautions. The need for them is rarely admitted by the untrained mind, except after long familiarity with sound teaching, or after bitter experience. The medical man is the educator of the public in these matters, and it is incumbent upon him to look to the future as well as to the present.

I speak hopefully of our power in limiting the ravages of scarlet fever. And yet of the means by which this is to be effected, I have but an old story to tell. I cannot suggest any new means of prevention, but I have no lack of confidence in those already in use. What is wanted is the more steady and preserving use of these means, and a provision for their application to the great foci of infection—the crowded courts of great towns. Both requirements are feasible.

Withering, in the past century, clearly laid down the true prophylaxis of scarlet fever. I set aside the fanciful

measures based upon his theory of the mode in which the infection of the disease is conveyed into the system. "It is of peculiar importance," he says, "also to know that the progress of the infection may be stopped by the use of very practical precautions, such as may be adopted in almost every house. When it first appeared among us, it often ran through whole families, and in boarding-schools particularly, it made such havoc that most of the schools in the town and vicinity of Birmingham were under a necessity of dispersing; and the yet healthy children of many families were sent home; but this method contributed to spread the infection more widely and more speedily through the country.

"From the time Dr. Haygarth first communicated to me his ideas of stopping the progress of the small-pox, the probability of stopping the progress of scarlet fever by the adoption of similar methods was too evident to escape the most inattentive observer. The first trials proved successful: and the full body of evidence, elucidated by the clearest reasonings, which appeared soon afterwards from the same masterly hand, encouraged me to proceed; and now for several years past, I have never thought it necessary either to break up a school or to disperse a family. Allotting apartments on separate floors to the sick and to the healthy; choosing for nurses the elder parts of the family, or such as had the disease heretofore, and prohibiting any near communications between the sick or their attendants, and the healthy, with positive orders to plunge into cold water all the linen, etc., used in sick chambers, has very universally been found to check the further progress of the infection."*

Dr. Richardson, writing two years ago, insists on the carrying out of a stringent isolation of the sick. "Dr. Blackburn," he says, "half a century since, entirely proved that, even in a boarding-school, the disease would not spread if the patients were confined to one room, and the attendants were kept altogether away from the infected. Nor should the separation of the patient be confined merely to the time when the acute symptoms are being manifested; *it should extend to at least a month after the date of the commencement of the attack.* In the second place, the room of the patient should be kept sedulously ventilated, as well for his

* An Account of the Scarlet Fever and Sore-throat, or Scarlatina Anginosa; particularly as it appeared at Birmingham in the year 1778; to which are here prefixed some remarks on the Nature and Cure of Ulcerated Sore Throat. By Wm. Withering, M.D., F.R.S. Birmingham: 1793.

own safety, as for that of others. Lastly, as it is obvious that almost every material object in contact with the patient is capable of holding the poison, all articles of clothing and furniture should be thoroughly disinfected by the best of all disinfectants, heat at boiling point, before the susceptible body of another person approaches him. With strict adherence to these simple rules, this disease, according to my experience of it, can be kept safely from propagation."*

My own experience largely coincides with that of Dr. Richardson. But the difficulties to be contended with in securing effective isolation must not be underrated. Nothing but the extremest tact and care can overcome them, or exclude all probable modes of propagation of the infection. At times even our best efforts may be unavailing. But this does not militate against the advisability, nay, the imperative necessity, of such efforts.

In securing an effective ventilation of the room occupied by the patient, and preventing the formation of depôts of the poison, it is well to insist upon all superfluous articles of furniture, including carpets and curtains, being removed. These should be thoroughly cleaned and ventilated before being stored up or placed in other rooms. I am in the habit of advising whitewash or fresh paper to the walls, and paint to the woodwork, after the cessation of the disease, when practicable. When not practicable, and when the condition of the walls and ceilings renders their being fitly cleaned somewhat doubtful, it is well to inundate the room for some time with nitrous acid or chlorine gas. Again, if a thorough ventilation of a room cannot, as is too often the case, be obtained, it will be advisable to make frequent or constant use of chlorine or nitrous acid, given off in small quantities, so as not to irritate the patient's lungs. The vapour of iodine also may be used as recommended by Dr. Richardson.

Frankly, I have a distaste for gaseous disinfectants, unless they are absolutely required. They are too commonly made a plea for the neglect of the more important measures of cleanliness and ventilation. The majority of people are apt to place their chief reliance on these disinfectants. They are dangerous adjuncts to prophylaxis on this account; hence I never use them if I can properly avoid so doing.

But there is a class of cases which, from the nature of the patients' homes, and the impoverishment of their fami-

* Asclepiad, vol. i, p. 111.

lies, cannot be dealt with in the manner above indicated. Neither separation, nor cleanliness, nor disinfection, can be obtained for them. These cases, which always exist more or less in great towns, are the persistent sources of infection in the kingdom. Any scheme of limitation which does not provide for them, of necessity fails in its most important part. Withering had pointed out the probability of stopping the progress of scarlet fever in the same manner as the progress of small-pox might be stopped. This, it will be remembered, was anterior to a knowledge of vaccination. The full significance of Withering's remark does not, until lately, appear to have been rightly understood. The credit of giving that development to the suggestion of which it is capable, belongs, so far as I am aware, to Dr. Morgan, the honorary secretary of the Manchester and Salford Sanitary Association. In his report on the health of Manchester and Salford in 1863, he makes the following observations in reference to scarlet fever:—

"We should consider, inasmuch as the disorder is even now raging, what steps can be taken by the Sanitary Association with the view of settling some barrier to its onward march. And here let us recall to mind the course of action adopted some twelve months ago when a similar danger impended from small-pox. At that time the Sanitary Association not only called upon the authorities to use their best efforts in enforcing the removal of the sick from the abodes of the healthy, but also, through the public press, made known the reality of the peril and the best method of checking its encroachments. As a consequence of the timely warning thus raised, no fewer than 331 patients were removed to the public workhouses' fever wards; and, inasmuch as the total number of seizures in the course of the year did not exceed 1,269, 1 in every 3.8 were separated from their relatives, and thus prevented from becoming so many fresh centres of infection. When, however, we turn to inquire how far this attention to the isolation of affected persons has been observed in respect to scarlet fever, we find that in the course of the year only 28 out of 1,927 patients were removed to the workhouses and fever hospital. To the encouraging of such separation of the sick, the Sanitary Association will doubtless direct its best efforts. The object may probably be promoted by addressing the boards of guardians on the subject; and, likewise, by pointing out to the managers of schools and of mills the great danger attending the admission of children from houses in which the disorder is known

to prevail, and by not allowing the convalescent to return to their work for some weeks subsequently to their recovery. Such precautions, at the present day, are constantly observed in the better regulated schools throughout the country, and considering the heavy issue at stake, the hardship of enforcing them on the poor would not be oppressive. These remarks naturally apply solely to the poorer portion of the population, those in fact who are dependent on charity for their treatment in sickness. But the question arises as to whether, when epidemics are raging, it might not be expedient to encourage the establishment, in various quarters of the town, of self-supporting institutions, in which, on the payment of a weekly fee, the children of artisans and of such persons among the middle classes as might desire to avail themselves of their benefits, might obtain admission. Such institutions should be situated in those quarters of the town in which the disease was observed to take a mild type. By such an arrangement those dwelling in localities less favourable to the disorder would, by the circumstance of removal alone, reap advantage. In many cases, also, in which at present every member of a family is successively attacked, the immediate removal of the first seizure might arrest the disease at its source."

But to facilitate the separation of the pauper and impoverished sick, a more extensive public provision for their reception than at present exists would be required. Without this a systematic encouragement of separation would be to a large extent futile. This provision would probably be best made by the construction of buildings or wards, for this special purpose, in connection with all public hospitals and workhouses, where no such buildings or wards exist. These buildings should be of the simplest construction consistent with their durability and fitness for the purpose to which they would be devoted. Such special provision, supplemented in epidemic periods by self-supporting institutions for the infected of the well-to-do operative and other classes, would permit cases of infectious disorder to be weeded out of the denser masses of population as they occur, to the incalculable gain of the people, and with probably little pressure on public charity and the rates. Many stumbling blocks may interfere with the practical realisation of these suggestions, but none perhaps which are to be looked upon as insuperable.

[ERRATUM, p. 262, fourth line from bottom, *for* 128 *read* 126.]

ON THE LIMITATION OF VENEREAL DISEASES AMONG THE CIVIL POPULATION.

By Dr. BABINGTON, F.R.S.

[*Read Feb. 6th*, 1865.]

Among the preventable diseases, many of which have been brought to light of late years by sanitary reformers, there is none which is more preventable than the venereal disease; every one knows how it is acquired, and every one may avoid so acquiring it, yet it is perhaps as prevalent now, at least in this country, if not as destructive, as it ever has been in modern times. Improvements in the method of treating this baneful malady have no doubt been made, and there is reason to believe that still greater improvements will, in the progress of medical science, be suggested, but hitherto there has been no attempt on the part of the legislature, and next to none on the part of the public in this country to diminish its prevalence. In France we know that all women who live by open prostitution are compelled to submit to registration and periodical examination.

The whole system of control, as conducted in Paris, is described in a paper in the thirteenth volume of the *British and Foreign Medico-Chirurgical Review* (April, 1854), and I think it will be useful, before I proceed further, to make a short abstract of that system.

The registration consists in an entry of the individual's name, age, birth-place, residence, previous occupation, and motives for prostitution. The women declare to which class of prostitutes they belong. "Les filles isolées," who have separate dwellings: or "les filles de maison," who live in houses of tolerance or brothels. Those of the former class, on being registered receive a card, on one side of which are recorded their name, age, appearance, residence, etc., with the date of their registration; and on the other the regulations to be observed, as follows:—their appearance at the Dispensaire de Salubrité, for examination at least once a fortnight; restrictions as to their period of appearance in the streets, their dress, their behaviour, statement of local-

ities which they must not approach, restrictions regarding their lodgings, etc. On examination, if the individual be found healthy, her card is marked, and she retires home; if diseased she is conveyed to the hospital. The "filles de maison" are examined once a week at their brothels, and their health is recorded in a book kept by the mistress of the house. A woman resident in a brothel, if supposed to be diseased, is sent to the dispensary, there examined again, and if the supposition be confirmed, at once conveyed to hospital. As regards the mistress of a brothel, she is bound to register at the dispensary the names of the women in her house, and to give immediate information at the office of any changes of residence in her inmates. Various rules are laid down for the management of these, as respects their health, their orderly conduct, etc.

The medical staff is composed of twelve physicians, of whom one has the title of chief physician, and three of these officers are always present at the examinations at the dispensary. There are also a number of agents of police employed in ascertaining whether all the women attend the examinations, in conveying the diseased to hospital, in visiting the brothels to prevent irregularities, also in endeavouring to suppress clandestine prostitution.

The government consider it immoral to receive the earnings of crime, so that the entire expense of the control over and treatment of these women is defrayed out of the public treasury; prostitutes in Paris are, therefore, exempt from tax, and are punished by imprisonment and never by fines. In this respect the Prussian system differs from the French, for in the brothels at Berlin each woman pays to government from six to nine shillings a month, and the brothel keepers themselves pay £15 on commencing their business, besides being punished by fines for all transgressions against the elaborate regulations laid down for their guidance. It is obvious that these systems of control, whether French or Prussian, for they do not materially differ from each other in the main features of registration and examination, must have a great influence in diminishing the amount of venereal disease; for I presume it to be the case in Paris, as it is here, that a very large proportion of cases of that disease are traceable to communication with public prostitutes.

The great objection to carrying out the French system in this country seems to be the aversion of our legislators and of the public to adopt measures which appear not only arbitrary as interfering with the liberty of the subject, but also

morally wrong as sanctioning by implication the profession of prostitution in the very fact of controlling its exercise.

I am by no means sure that this view of the subject is sound; it is true that France is governed despotically, and true also that, in opposition to this, we are the freest nation on earth; but what is or ought to be meant by freedom? I take it to be the power or right to do everything we choose which is not morally wrong or inconsistent with an equal right in others to do the same. But freedom to do what is right within these limits is inconsistent with freedom to go beyond these limits; thus to do what we like with our own property is inconsistent with doing what we like with property of others.

If a thief were as free to steal another's property without punishment as an honest man is free to do what he likes with his own property, there would be an end to all law and order in society. It seems to me, therefore, that the freer the country, or, in other words, the freer every individual is to do as he likes within the bounds of rectitude, the more stringent should be the laws of restraint upon those who desire to do wrong, and hence that we who are a free people, have more right than the French to make laws restrictive of vice.

Illicit intercourse among the unmarried is unquestionably immoral, and in itself contrary to the good of society, and I believe we tolerate it, first, because it is impossible to prevent it. It is inherent in our nature, and such seems to have been the opinion of all wise men from St. Augustine to the first Napoleon; and, secondly, because there is a still greater evil in putting a stop to it. As an illustration. When I was in Florence in 1826 there were but three women, so at least I was told, who were regularly recognised as "donne publiche" or prostitutes; but what was the consequence? adultery was so common that very few married women had the credit of being faithful wives; they, in fact, in a great measure, filled that position which in this metropolis is occupied by prostitutes, with I need not say a far more baneful influence on the general morality of the people.

A still worse state of morals we know to be induced where there is either a prohibition to the union of the sexes, as was the case with the late Mamelouks of Egypt, or where there are no women, as in the case of the prisoners in Norfolk Island.

But though prostitution is thus an evil which must be tolerated, I do not admit that we sanction it by subjecting those who practise it to registration or examination.

There is a wide distinction between approval or sanction and toleration: thus, we tolerate gambling to the extent of allowing men to bet upon horse racing and other events, yet we cannot be said to approve of it; and in proof of this, we place it under restraint by prohibiting lotteries, betting-houses, or gambling booths at race courses. We do not approve of drunkenness, yet we neither interdict the use of spirits nor interfere with the drunkard himself, unless he publicly exposes his vice. In that case, however, we fine him, and, moreover, we put a high duty on spirits, register and visit distilleries, and punish illicit distillation. The evils of drunkenness are very great, insomuch that in one of the American States they forbid the use of spirits altogether, yet those evils are scarcely so great as those which arise from the infection of syphilis. Were these confined to the individual, they might be regarded as a just punishment for the commission of sin, and be of consequence only to its perpetrators; but it must never be forgotten that syphilis is hereditary, that the offspring of those parents, whether father or mother, who are tainted with it, may suffer for generations to come. The innocent expiate the sins of the guilty; the nation itself is deteriorated, and hence it becomes a legitimate question for the interference of government, whose province it is to provide for the public good. For myself, I confess I do not see why the legislature should not, for the sake of establishing greater freedom among the virtuous, interfere with the freedom of the vicious. Even as to the feasibility of carrying out the French plan, I cannot perceive any insurmountable obstacle. Public prostitutes are the great source of contagion as affecting the bulk of the people; they are, as I understand, all well known to the police, and there would be no insuperable difficulty in identifying them. To carry on their business, publicity is essential; and if to seek votaries they are compelled to walk the streets, whether by day or night, they cannot possibly conceal their avocation from those whose express business it is, or ought to be, to watch their movements. I much doubt whether, on their part, there would be any desire to avoid registration. There might be some resistance at first, but it would not be permanent, and an Act of Parliament on the subject would probably cause as little sensation, and meet with as little opposition as was encountered by the compulsory vaccination act. Prostitutes would, in fact, be great gainers by such a change; for registration and inspection would necessarily involve in its details support and treatment

during sickness. At present a public woman is compelled, ill as she may be, to ply her trade simply because she has no other means of support, and she becomes a source of contagion even against her will; whereas if she were either treated in the establishment to which she might belong, or were placed in an appropriate hospital or house of recovery, she would not have the terror of destitution to deter her from confessing her malady; but, on the contrary, every reason for desiring to make it known in the proper quarter, in order to get rid of it as soon as possible. We must not suppose, however, even if we had a system of registration and examination of public prostitutes, that we should attack all the sources of venereal disease; for numerous as is the class of public prostitutes, it is calculated that this is not more than as one to five or six of those who practise prostitution clandestinely, and who are probably, in proportion to their numbers, as much the subjects of disease as the others. A most striking instance of the value of control over public prostitution is furnished in the case of Berlin. From 1700 to 1845, regulations and control existed in that city, when an outcry was raised against thus legalising crime, when all the brothels were closed, and the occupants, with those who were discovered to be living by clandestine prostitution, were sent to their native homes. This system was continued till 1850. Prostitution was, during the interval from 1845 to 1850, as with us, ignored altogether, and left to take its natural course. The result was, that while in 1839 between 600 and 700 clandestine prostitutes were known to the police, in 1840, consequent on the number of brothels having been restricted, they increased to about 900; while in 1847, or a year after these houses were closed, 1,250 were known to the authorities; and in 1850, they had increased to so high a number as 8000.

In 1850, registration and control were again established, and an immediate and great decrease was the consequence. Under the ignoring system, syphilis increased to a frightful extent. It spread, as it is recorded, into the best families, and unnatural crimes became very frequent. With such facts before our eyes, I believe that the onslaught that is now making upon the brothels in this metropolis is most impolitic. The result will be a vast increase in clandestine prostitution, and a spreading of public prostitution itself broad-cast through the town, making half-a-dozen secret brothels where one existed before.

Under the supposition, however, that we are not prepared

to follow the example of our enlightened neighbours, the French or the Prussians, are we on that account to do nothing? Are there no means of improving the present very unsatisfactory state of affairs? It strikes me that one great cause of the unwillingness of prostitutes to take measures for their cure, when affected with venereal disease, is that they cannot do so without either presenting themselves at a public hospital before a number of students, and thus damaging their character, or applying for relief to a private practitioner, and thus exhausting the slender pecuniary fund at their disposal. I would propose, therefore, that throughout the metropolis medical men should be appointed in numerous districts to attend gratis, either at their own houses or at appointed houses of recovery, according to the severity of the case, women who are the subjects of venereal disease; and that those medical men should be remunerated in the same manner as public vaccinators. How much they should be paid for each attendance, and from what fund that payment should be supplied, are questions of detail. The public vaccinators now receive so much a case for successful vaccination from the guardians of the parish, payable out of the poor's-rate, the whole being under the control of the Poor Law Board. It is doubtful, however, whether such a plan would be applicable to cases of venereal disease, because these would be so unequally distributed in different districts. In such a parish as St. Martin's, for instance, there probably would be ten times as many prostitutes in proportion to the population as there would be in St. George's, Hanover Square. I am inclined to think that it would not be desirable to allow the police to have anything to do with the carrying out of such a plan, nor to appoint the police surgeons to attend these venereal cases. There is always a natural aversion to come in contact with the police. The district officers of health would be preferable, but they are few in number, and have already as much public work to do as is compatible with their duties as private practitioners. Upon the whole, it would perhaps be best that another set of medical men, apart from those now employed in public duties, should be selected, and that they should do their work with as little publicity, and as much after the manner of private practice as possible. The reluctance which would otherwise be felt by patients to avail themselves of their services would thus be best overcome. It would be a necessary part of such a plan, that lock hospitals, perhaps, in the shape of private houses of recovery, hired for the purpose, should be pro-

vided in different districts, both to insure the carrying out of proper treatment in severe cases, and to save the patient an expense while ill, which she could not bear from her own resources. When cholera first broke out in this country, there was a Government Medical Board formed in London, of which Sir Henry Halford was the president, and their office was to devise measures for arresting this disease. Might not some such Government Medical Board be formed for the purpose of considering the best mode of diminishing the amount of venereal disease among the civil population, and of carrying out such measures as I have above recommended, or any others which might appear to them more eligible. Whether the medical department of the Privy Council might not undertake these duties, or whether a board expressly formed for the purpose, as the late vaccine board was for the carrying out of vaccination, would not answer better, is a question which the legislature could best determine.

In whatever way some such system as I have sketched out were brought into operation, and made sufficiently known, I am persuaded that a vast number of those who clandestinely practise prostitution, and become diseased, would avail themselves of the means of cure thus afforded them; and that the result would be most beneficial in a sanitary point of view to the public. With respect to the prudence of those who affect to make objection to the cure of prostitutes, on the ground that it is an encouragement to vice, it is not worth considering; as well might we object to the relief of destitution, on the ground that it is an encouragement to idleness. I purposely abstain from making more than a passing allusion to the new act, Vic., July 29, 1864, for the prevention of contagious diseases at certain naval and military stations, whereby at those stations women suspected of having venereal disease are examined, and if the suspicion be confirmed are sent to hospital for cure; whereby, also, the keepers of brothels are punishable by fine, if they harbour prostitutes whom they have reasonable cause to think are diseased. The act has been in operation too short a time to enable us to judge of its effect, and it rather has reference to naval and military than civil life. Thus much, however, appears already established, that the women make no particular objection to the examinations in question, so that there has, as far as I have learned, been no difficulty or obstacle in the way of carrying the provisions of the act into effect.

The exigency of the case has now become so great, and so

radically affects the general welfare, that I am prompted, moreover, to propose for consideration, independently of all government measures, a third plan not incompatible with either of the others; namely, that a great society should be instituted for the express purpose of combating this monstrous and crying evil. In making this suggestion, I have in my mind not a mere local body proposing for its object a scientific or philosophical consideration of the means of distinguishing, treating, or preventing venereal disease; for a very limited number of medical men who had paid especial attention to this subject would suffice for such a purpose. What I contemplate is a widely spread association counting its members by thousands, like the Society for the Suppression of Vice, the Royal Humane Society, the Royal Fire Escape Society, etc. We are raising millions to provide for the spiritual wants of the people. Is it not next in importance to this to get rid of a disease which counts its victims by myriads, and descends from generation to generation? I would call such an association by a designation which should not shock the delicacy of the most refined. I would name it "The Health Union, for the diminution of preventable contagious diseases." By appropriate circulars it would be readily understood for the prevention of what class of diseases the union was formed.

There are few in any rank of society above the lowest, at least such is my hope, who would not bestow their annual guinea in providing funds for the supply of medical attendance, and suitable reception houses for those, who, being the subject of this disease themselves, are each a constant cause of its propagation among others. Let such a body be ruled by a council of experienced and practical men, medical and others. It is incalculable the amount of good which might result from such combined efforts.

The observation which I have already made respecting the vast proportion of clandestine prostitutes, many of them diseased, who, under no system, came under the observation and control of the authorities, points to the necessity for providing some such means for their purification.

I have thrown these crude observations together merely for the purpose of exciting discussion here, and of ventilating a question which at the present time loudly demands investigation and practical treatment.

ON DIPHTHERIA IN BERMUDA.

By Dr. SMART, R.N., Deputy Inspector-General of Fleets and Hospitals.

[*Read March 6th*, 1865.]

In September, 1862, this disease fell under my observation in Bermuda, in the person of Benjamin Eston, a steady, well-conducted young negro servant, age twenty-three, dwelling in the house of Dr. Domville, on Ireland Island.

As far as his ordinary residence and his diet were concerned, nothing could be more advantageous. But within a recent period prior to his illness he had frequently slept on Somerset Island, amidst sanitary conditions less favourable than those he was accustomed to at home.

From inquiries subsequent to his attack, it was ascertained that several deaths, after short illness—"sore throat with copious expectoration, ending by suffocation"—had recently occurred among the children of the negro population of Somerset Island.

Eston did his duty, without complaint, up to the evening preceding the day when he presented himself with symptoms of prostration and sore-throat, and on examination, a suspicious-looking dark spot with red areola, was seen on the soft palate. The treatment was, from the first, of a stimulant nature, both topically and systemic. The inflammation-changes extended over the palatal pillars to the pharynx, almost closing the faucial chink, and the submaxillary and cervical glands became enlarged.

On the fourth day, afternoon, he began to spit up plastic casts of the laryngeal walls, and the same kind of exudation covered the soft and the hard palate, capable of being stripped off, but leaving the surface raw and bleeding.

On the fifth day dyspnœa became more oppressive, and signs of acute bronchitis, with jactitation set in. He died on that evening axphyxiated.

Inspection of the corpse discovered a diphtheritic membrane extending from the tonsils, through the larynx, into the divisions of the left bronchus, to their ultimate rami-

fications in the upper and lower lobes. This false membrane was detached by manual force, and drawn out in its continuity, so that it presented an exact mould of the air-tubes, resembling the taproot and radicles of a plant. The pulmonary tissue was highly injected with blood, presenting defined lobuli in a state of "pulmonary apoplexy."

Until this case occurred, no suspicion had been entertained of the presence of this epidemic disease, although there had been several deaths prior to this, clearly traceable to the same malady.

In October there were a few cases, but none fatal, among the white population in Somerset. At a later date I was consulted on the sequelæ in one of those cases, in the person of a youth named Morgan.

This patient had had the throat affection, with copious spitting of "tough phlegm," in October; and, during convalescence, he suffered from aphonia, then from amaurosis; and recovering from these, he was attacked with a partial paralysis of all his limbs, of which the lower were worst affected, sensation and motor functions being equally diminished. Under treatment by the electro-magnetic current, and tonics of zinc and strychnia, he recovered perfectly.

On Somerset fatal cases were treated as late as Christmas, while on Ireland Island there was no other instance of the disease. In distant localities there were fatal cases of sore throat scattered here and there—in Warwick and in Devonshire parishes; and, for the most part, those cases were traceable in popular opinion to visiting Somerset, or to infection derived from some person who had fallen sick after visiting that parish.

Until May, 1863, no other case of "diphtheritis" presented itself on Ireland Island; but there were numerous instances of follicular inflammation of the tonsils, all of which were treated, with regard to the epidemic tendency, by nitrate of silver applications to the inflamed surface, and draughts of chlorate of potash in vegetable bitters.

A succession of such cases continued until the middle of May, when they increased in frequency, the last cases presenting tonsillar inflammation, with white patches over the orifices of the cryptal ducts, and glairy secretion, attended by low fever. In most cases the submaxillary and cervical glands were irritated, and in several instances suppuration occurred around the latter. The pharyngeal symptoms were noted to be more urgent than the laryngeal, and it was observed also that, after the subsidence of the stage of active

inflammation, there frequently remained dysphagia of a purely nervous character, together with a strangely raucous voice, like that present in cleft palate malformation, which symptoms were attributed to defective innervation of the velum palati, and muscles of the pharynx.

This form of malady ran through several families.

The fever signs were of a low type, demanding persistence in the use of stimulants.

The faucial signs being suggestive of scarlatina, at first, the skin was examined daily; and although the true rosy scarlatinous rash was not detected, there were instances of a dusky mulberry rash, resembling that of typhus fever, spotted over the abdomen and the front of the limbs.

In the first week of June, two fatal cases of this type happened in children dwelling on Ireland Island; and no doubt was entertained of their true diphtheritic character, in the absence of autopsies, which were not practicable, to verify the diagnosis.

The death of a child was followed by the illness of its mother, a Mrs. Taylor, who; after rallying from the exudation stage and its immediate sequelæ, fell into a state of extreme nervous prostration. She emaciated rapidly through paralysis of the muscles of deglutition, causing her to decline sufficient nourishment and medicines.

The entire intestinal tube appeared to partake of this defect of innervation. Peristaltic motion seemed to be arrested from the œsophagus to the anus, digestive power was at its lowest degree, and coprotic concretions accumulated in the colon and rectum, distending them, and requiring the use of the scoop for their removal.

In this state she lingered through four months, and then expired on awaking from sleep.

After midsummer no fresh cases were seen among the Dockyard colony; but the children of the soldiers in barracks on Ireland Island then offered a fresh focus, in which several fatal cases occurred. At the end of July, nothing more was heard of this disease in the Bermuda Islands.

Shortly after the disappearance of diphtheria, another epidemic malady, the dengue or break-bone fever, made its appearance at St. George's, and spread through the islands in the autumn of 1863.*

* In 1864 yellow fever took the place of dengue as the epidemic of that autumn.

This is not the first occasion on which true diphtheria has visited the Bermudas; but there is no evidence that it has at any time assumed widely-spread epidemic force.

As far as I have learnt, the disease has always proved fatal in the majority of attacks. In the autumn of 1858 it was first recognised in Hamilton-town and its surrounding district.

Mr. Heyle, druggist, of Hamilton, lost then three children in one week, by diphtheria. His account of the disease in his family is a very clear one, and he attributes it to importation from abroad by a family connection of his own, who commanded a merchant-vessel, lately returned to the Bermudas. Mr. MacPhee Lee, Queen's printer, lost two children that same season, one by scarlatina with ulcerated throat, as it was termed, and the next by diphtheria. He ascribes his family misfortune to infection taken at school, of which he has, however, no proof to offer. He states that his children fell victims earlier than those of Mr. Heyle, which is of some importance in estimating the suspicion of direct importation raised by Mr. Heyle's statement. Dr. Hinson, practising in Devonshire parish, a marshy inland district, running inland from the head of Hamilton harbour, informed me that he had frequently seen the true membranous diphtheritic exudation in his district, in sporadic cases scattered as to locality, and distant from each other as to time; but he had never known the disorder spread epidemically from such cases.

From these few facts, I am of opinion that much interesting information may be gathered by a fuller investigation of the history of the origin and spread of diphtheria in the Bermudas, information which might be of value in analysis of the general pathology of the disease.

NOTICES OF EPIDEMICS IN THE COLONIES OF CAPE OF GOOD HOPE AND NATAL IN 1862-63.*

By ROBERT LAWSON, M.D., Deputy-Inspector of Hospitals and Principal Medical Officer on the Station.

[*Read March 6th*, 1865.]

In 1861 measles had prevailed pretty extensively over the Cape Colony, and towards the end of the year at Natal. It continued at various points in the beginning of 1862.

Diphtheria was seen among the children of the civil population at Keisham Hoeck, in March 1862; and what is denominated ulcerated sore throat, with a tendency to catarrhal and bronchitic affections, was frequent at Cape Town, Port Elizabeth, and Fort Beaufort. Fever, mostly of the typhoid form, and diarrhœa, were also frequent at Cape Town and Port Elizabeth, probably determined, at the latter place at least, by night soil deposited in the various gullies through the town, and the brackishness of the water employed for domestic use.

In February, 1862, there was a good deal of remittent fever among the troops at the Lower Tugela post, at Natal.

Towards the end of 1862, varicella was common among the children in Cape Town, but no indication of it is found in the returns from other stations.

* The position of the places named in the accompanying remarks are:—Port Elizabeth, on the coast, Algoa Bay; Graham's Town, eighty-four miles north of Port Elizabeth; Fort Beaufort, forty-six miles north of Graham's Town; Middle Drift, twenty miles east of Fort Beaufort; Keiskama Hoeck, eighteen miles north of Middle Drift (surrounded by Ainatola mountains); King William's Town, seventy-four miles north-east of Graham's Town; East London, thirty-six miles south-east of King William's Town, on the coast; Dolme, twenty-six miles north-northeast of King William's Town; Hyndrogelberg, thirty-five miles north-west of Dolme; D'Urban, the seaport of Natal; Maritzberg, or Pieter Maritzberg, fifty miles north-west of D'Urban; Fort Buckingham, or Upper Tugela Port, on high ground overhanging river Tugela, about sixty miles from the sea; Lower Tugela Port, close to bank of Tugela, about four miles from the sea. The Tugela forms the boundary between the colony of Natal and the Zulu country, to the north-east. The Drachenberg range separates Natal from the Basuto country and Free State to the north-west.

The period, on the whole, manifested a considerable tendency to affections of the chest and air passages, both as primary affections, and as local complications in other diseases. The fact is the more worthy of notice as, a few months later, what has been called the lung sickness, which appears to be intimately connected with malaria, became very prevalent among the domestic animals in some parts of the Cape Colony, and still more in Natal.

In March 1863, small-pox was reported to have appeared among the natives in the upper districts in Natal, and in the country beyond the Drackenberg range the disease continued until August, in various places within the colony, but was most prevalent to the north of the Tugela River, which forms the boundary between Natal and the Zulu country. The mortality was considerable. Some cases of varicella occurred among the children of the 96th Regiment at Keiskama Hoeck during the year.

Typhoid fever type and diarrhœa were common at Port Elizabeth, in the end of 1862, and beginning of 1863; in February and March, they were frequent along the coast at Natal, and extended into the higher country, inland. Periodic fever was unusually prevalent in February, March and April, with a great disposition to bloody stools, at D'Urban. At Lower Tugela Post, several cases of a remittent form occurred, one of which, at least, seems to have been allied to yellow fever, there being turbidity of urine on the third day of the fever; soreness in the pharynx on the fourth; irritability of stomach with scanty urine and want of alvine evacations on the fifth; sordes on the teeth, and suppression of urine on the sixth; and what appears to have been bloody discharge from the nose on the seventh day, when the patient died. On dissection, brown streaks were found in the mucous membrane of the stomach, with a good deal of congestion. The medical officer who had charge of the case had frequently seen yellow fever in the West Indies.

Beyond the Tugela, at this time, a fever was prevalent, which the traders described as very fatal, deaths being frequently preceded by yellowness of the surface, and black vomit. A similar disease prevailed during the early months of the year at Klerkdorp, in lat. 26½ S. long, 37½ E., about 300 miles from the sea. The disease commenced in January, and carried off fourteen or fifteen out of a very small population. My informant not being of the medical profession, I was unable to obtain precise information regarding it.

In April, influenza appeared in the British Kaffraria, and

spread quickly over that and the Cape Colony, affecting the troops slightly, but the civil population very generally. It had nearly disappeared from the Cape Colony by the middle of May, but then became very common in Natal, and the country to the north of the Orange River. The disease declined in these districts in about a month, but for a considerable period afterwards there was an unusual disposition to catarrhal affections at many of the more inland stations, where the elevation is considerable, and the weather was cold. Hooping cough was frequent, and fatal among the children about Queen Town and Burghers Dorp. Typhoid fever became rather common round Hyndrogelberg in July, on to September; and cases were occurring at Keiskama Hoeck and Port Elizabeth at the same time.

In the latter part of 1862 and beginning of 1863, catarrh, quinsy, with several cases of diphtheria, hooping-cough, diarrhœa and dysentery, were the prevailing maladies throughout the colony. Remittent fever was very general at Maritzberg, and alvine flux at D'Urban.

Ophthalmiæ, which had prevailed extensively in 1862, continued frequent in January and February 1863, from which time the number in hospital with this disease began to decline.

Pleuro-pneumonia among horses, and what is denominated gall sickness among horned cattle, occur more or less every year in the valleys and damp low lying ground, in the frontier districts of this colony, and in the lower country in Natal. In the early months of 1863, these affections were more then usually frequent, and considerable numbers of cattle and horses died. The mortality among dogs, pigs, and poultry, was also noticed to be higher than common, especially in Natal.

With respect to the cases alluded to in this paper having many of the characters of yellow fever, it is worthy of notice that this was not the first occasion on which such instances have been observed in the South African colonies. In 1859, three such cases occurred at King William's Town, in soldiers of the 2nd Foot; they proved quickly fatal, and had been attended with yellowness of the surface and black vomit. The medical officers who treated the cases considered them to be cases of yellow fever.

VACCINATION IN TASMANIA.

By Dr. E. SWARBECK HALL, Superintendent of Vaccination.

[*Read April 3rd*, 1866.]

ABSTRACT.

HITHERTO this island has fortunately escaped any visitation of small-pox. This remarkable exemption, however, has probably rendered the colonists even more apathetic in having their children duly protected by vaccination, from the usual consequences of this disease, than is the case in England.

In 1853, a compulsory Vaccination Act was passed by the Legislative Council of Tasmania, requiring every child to be vaccinated before attaining the age of six months, under a penalty of five pounds. No public vaccinators, however, were appointed at that time, or any provision made to afford gratuitous vaccination. The Act has never yet been enforced, and people only regard it as a bugbear. Occasionally, under the alarm of the probable introduction of small-pox into the island, some stir has been made for a time to have the children of the colony generally vaccinated. But the panic usually soon died away, and the neglect of vaccination becomes again the rule. These paroxysmal efforts have pretty closely observed a septennial order of recurrence. In June last year (1863), the colonists were startled into activity by the news of the great prevalence and mortality of small-pox in London. Dr. Swarbeck Hall had often drawn the attention of the Legislature and the public to the neglect of the provisions made by the compulsory Vaccination Act, and the danger to the population thereby incurred. On this occasion he renewed his warnings, and the Tasmanian Parliament being in session, an amended Vaccination Bill was introduced.

The most novel and important clauses in this "Amended Bill" are 5 and 6, which provide for the division of the island into vaccination districts, and the appointment of public vaccinators, with the power of house to house visitation, to inspect and vaccinate all persons requiring it.

On the 2nd of October, 1863, public vaccinators, to the

number of seventeen, were appointed, and four subsequently; all being legally qualified medical practitioners, residing in or near to the districts apportioned to them. The district of Hobarton was given to Dr. Swarbeck Hall, with the superintendence of the scheme for the whole island, at an annual salary of £150. The public vaccinator of the capital of the north (Launceston) was awarded £125 per annum, and for each rural district £50, some of the vaccinators having two districts.

Since the 1st of January, 1864, Dr. Swarbeck Hall has had a printed slip of the Act served by the Registrars to every person registering a birth. A compulsory "Act for the Registration of Births, Deaths, and Marriages," has been in force since the close of 1838, and, for the last ten years, has been complied with. At his instigation, the Colonial Secretary issued to all the public vaccinators, on their appointment, the "Instructions for Vaccination", issued by the Privy Council, and at the same time published them for general information in the Government Gazette.

It appears, from the subsequent part of Dr. Hall's communication that the Vaccination Act was with difficulty worked for the first six months or so after it became law, upwards of six thousand having been vaccinated, and, it is believed, successfully, during that period. The public then became so much remiss, that it was found difficult to keep up a regular supply of fresh lymph through the island. "I am convinced," he says, "that there still remain in this island numbers of unvaccinated and imperfectly vaccinated persons, and that whenever small-pox visits us, it will be attended with a fearful amount of mortality. I have earnestly urged the Government to enforce the existing 'law' on all delinquents; but though I shall not despair of success, and continue to repeat my warnings at every opportunity, I fear nothing more will be done until the disease is actually amongst us; and then, as usual, both life and money will be extensively sacrificed."

ON RECENT ADDITIONS TO OUR KNOWLEDGE OF EPIDEMICS IN ENGLAND,

DURING THE SIXTEENTH AND SEVENTEENTH CENTURIES.

By J. N. RADCLIFFE.

[*Read April 3rd*, 1866.]

ABSTRACT.

THE object of this paper was to direct attention to the numerous references to plague and other epidemic disorders, scattered through the pages of the series of Calendars of State Papers in course of publication by the Record Office. A study of these calendars, and of the papers catalogued in them, would probably throw much additional light upon the prevalence of plague and other epidemics at the periods to which they refer. Mr. Radcliffe, to show the value of the new source of information on the chronology of English epidemic, made accessible by the publication of the Calendars, quoted numerous references to plague from the Calendar (Domestic Series) for the years 1664-1665.

The year 1665 was the period of the last and greatest outbreak of plague in London. The frightful ravages of this pestilence in the metropolis, at that time, have occupied attention, almost to the exclusion of its prevalence and devastations elsewhere in the kingdom.

An accurate knowledge of the extent to which plague prevailed in England during 1665, can only be obtained from local records. Our knowledge of the spread of the pestilence in that year is almost limited to the statements made by Defoe in his journal of *The Plague Year*. He says, "Either by our people of London, or by the commerce, which made their conversings with all sorts of people in every country, and of every considerable town necessary, I say by this means the plague was first or last spread all over the kingdom as well as in London, as in all the cities and great towns, especially in the trading and manufacturing towns and seaports; so that, first or last, all the considerable places in England were visited, more or less, and the Kingdom of Ireland in some places, but not so universally; how

it fared with the people of Scotland, I had no opportunity to inquire." He then adds, "It is to be observed, that while the plague continued so violent in London, the outports, as they are called, enjoyed a very great trade, especially to the adjacent countries, and to our own plantations; for example, the towns of Colchester, Yarmouth, and Hull on that side of England, exported to Holland and Hamburg the manufactures of the adjacent counties for several months after the trade with London was, as it were, entirely shut up; likewise the cities of Bristol and Exeter, with the port of Plymouth, had the like advantage to Spain, to the Canaries, to Guinea, to the West Indies, and particularly to Ireland. But as the plague spread itself every way, after it had been in London, to such a degree as it was in August and September, so all or most of those cities and towns were infected first or last; and then trade was, as it were, under a general embargo, or at a full stop, as I shall observe further, when I speak of our home trade."

In speaking of the trade in corn and coals to London during the pestilence, and of the precautions taken to prevent the crews of the ships engaged in the traffic from becoming the means of disseminating the disease, he says, "Yet all this precaution could not effectually prevent the distemper getting among the colliery, that is to say, among the ships, by which a great many seamen died of it; and that which was still worse, was that they carried it down to Ipswich and Yarmouth, to Newcastle-upon-Tyne, and other places on the coast, where, especially at Newcastle and Sunderland, it carried off a great number of people."

London is here considered as the place first infected with the plague, and the chief centre of dissemination of the disease throughout the kingdom. And this is the view commonly adopted, and with justice, probably, so far as the spread of the malady is concerned. But the Calendar of State Papers for 1665 shows that the plague became active in Yarmouth prior to London, and in Southampton contemporaneously with the increasing activity of the disease in London.

From the great outbreak of plague in 1636 to 1664, deaths from plague had been registered in the bills of mortality for the metropolis every year. In the last-named year six deaths were recorded. Two of these occurred at "the latter end of November or beginning of December," when rumours of the plague being in Holland had disturbed the minds of the people. These deaths caused "a great concern" among the

population, and they "began to be alarmed all over the town." It was not, however, until May in the following year that this fear was justified. During the first week of that month nine deaths from plague were registered; and, from the third week, the mortality steadily increased. The acme of the pestilence was reached during the week ending the 19th September, when 8,297 persons were buried, of whom 7,165 had died of the plague; and, at the close of the year the mortality from the disorder had amounted to 68,596.

Shortly prior to the period when, according to Defoe's history, the alarm of plague began first in 1664 to disturb the minds of the population of London, we learn from the Calendar for 1664-1665 that the pestilence had already been introduced into Yarmouth. A newsletter, dated the 18th November, states that a vessel coming daily from Rotterdam, to Yarmouth, had brought the infection there, and several had died of it. Again, William Nowell, writing from Norwich, on the 23rd November, to Henry Middiman, reports that on search into the report of the plague being in Yarmouth, it was found that, though in one house three had died, only one had succumbed to the plague, and the disease had not spread. One or two houses were shut up, because persons ventured ashore from a Holland ship, notwithstanding the limitation to the contrary. Then, under date the 25th November, William Conesty writes to Secretary Bennet from the *Swiftsure*, off Spithead, suggesting that directions should be sent to Yarmouth for preventing the spread of the plague. Finally, so far as relates to the year 1664, R. Bower writes to Henry Middiman, from Yarmouth, on the 30th November, and states that the sickness spreads, if the reports by the searchers of the number of deaths by plague are true; but, he adds, the latter "are drunken persons, and very poor, and may make false returns because of the large allowance they have for their work."

The following extracts from the Calendar, some curious, the majority of value as indicating the dissemination of the plague in many parts of the kingdom, during its period of augmentation in the metropolis, refer to the year 1665. In *March*, a death from plague is noted at Cambridge; in *June*, Southampton becomes infected. In *July*, the pestilence appears in Durham, Sunderland, and Wearmouth; and "many places" are referred to in a form of Common Prayer, dated the 6th of the month. In *August*, Dover, Sandwich, Eastry, Canterbury, Salisbury, the neighbourhood

of Oxford, Beverley, Woolwich, and Chatham, are enumerated among infected places; and Hull and Newcastle are suspected. In *September*, Deal and Portsmouth are included in the list of visited towns.

"YARMOUTH, *Feb. 8th.* — Rich. Bower to Williamson. The Ketch sent for men is so small, that they do not like to go in it, saying they shall be prize for any that attack them. 200 or 300 are waiting conveyance, and had better be gone, as one person has died and another sickened of the plague in the town."

"CAMBRIDGE, *March 9th.*—Rich. Bower to Williamson. Is coming to town to see Mr. Middiman. One has died at Cambridge of the plague."

"*March.*—Statement of the advantages of a quarantine, besides that of keeping off the sickness as mentioned in the petition, viz., securing the customs, regulating imports, making freer and cheaper markets by its being known what merchandise is in port, discovery of persons coming in, which are merchants, and which travellers, &c."

"*May?*—Proposals for expedients of prevention of the plague, showing that the infection greatly spreads by the present attempts at concealment, and by not shutting up a house till some one in it dies, as many persons may have visited the house and spread the infection in the interval; but if it were published that every infected person shall have medical attendance, &c., and payment for loss of time, persons would not conceal their misfortunes; and forty houses thus provided might prevent the infection of ten thousand. With proposal that a stock may be raised, physicians appointed, and commissioners, accountable to the King, be joined with the physicians for their management."

[During the month of May forty-three deaths from plague were registered in the London Bills of Mortality. Defoe graphically describes the alarm of the people, and their certainty that the "Bills" were erroneously made up to hide the infection.]

"YARMOUTH, *June 16th.*—Rich. Bower to Williamson. Thirty have died of the plague; it will increase until there are cleansing-houses, which the people do not like to build, on account of the charge. Infected families are put altogether, and then after the month return to the town. The poor make sad lamentations, being deprived of the charity and trade of the inhabitants, who are fled, so that it is like a country village. Is glad the fleet has left Southwold Bay, for many people of the town flocked to see their relations on

board, pretending to have come from some other country town. Hopes the fleet may have received no prejudice."

"ISLE OF WIGHT, *June 19th.*—Col. Walter Slingsby to Williamson. The company of 'The Greyhound' being sickly, gives cause to idle people to suspect the sickness; but there is no such matter. A house in *Southampton* has been shut up on suspicion of the plague; but the physicians and surgeons say that is not the case."

"*June 20th.*—J. I. (John Ironmonger) to Sir Thos. Gower. The designers hardly dare trust one another. London is the place, and all depended on the success of the Dutch, and hopes from France; they were dead on news of the victory, but build much on the increase of the plague."

"YARMOUTH, *June 24th.*—Rich. Bower to Williamson. There have twenty persons died of the plague, being a decrease of ten since last week."

—"Statement by Lord Arlington that the Council, in their care to prevent the spreading of infection, have ordered the Justices of Middlesex to treat with James Angier for remedies to stop the plague and disinfect houses; the experiment being made in the house of Jonas Charles, of Newton Street, St. Giles-in-the Fields, and other infected houses, and no persons have died of the plague in those houses since; therefore, the said Angier's certificates from abroad having been further examined and approved, the justices wish to advertise the public where his remedies may be obtained, and give six addresses where they are sold, promising a fuller narrative of the experiments made with them." ["One of the boldest attempts to profit by the credulity of the public," writes Brayley, in his edition of Defoe's *History*, "was made by James Angier, Esq., who seems to have actually obtained the sanction of the Government in support of a scheme for disinfecting houses, said to have been tried at Paris, Lyons, Toulouse, and in other cities."]

"NEWPORT, ISLE OF WIGHT, *June 26th.*—(Col. Walter Slingsby) to Williamson. The small-pox is in the town and is turning to the worst of spotted fevers, as the plague is in Southampton."

"PORTSMOUTH, *June 29th.*—Comr. Thos. Middleton to Sam. Pepys. Departure of ships. Dares not send to view the cordage at Southampton, as the plague is in the town, and eight houses are shut up; has forbidden the carpenters who live there to go home; those already gone shall not be re-admitted into the yard." [During the month of June the deaths from plague in the metropolis, registered in the Bills of Mortality, amounted to 590.]

"PORTSMOUTH, *July 2nd.*—Comr. Thos. Middleton to Sam. Pepys. The sickness increases at Southampton; booths are built outside the town for the sick to be carried into."

"PORTSMOUTH, *July 6th.*—Comr. Thos. Middleton to Sam. Pepys. The sickness increases at Southampton. Great care is taken to prevent any communication with other towns.

PORTSMOUTH, *July 6th.*—Sir John Mennes to the Navy Comrs. The plague increases at Southampton; the poor will not suffer the rich to quit the town and leave them to starve."

"LONDON, *July 6th.*—A form of Common Prayer; together with an order for fasting for the averting of God's heavy visitation upon *many places* of this realm. The fast to be observed within the cities of London and Westminster, and places adjacent, on Wednesday the twelfth of this instant July, and both there and in all parts of this realm on the first Wednesday in every month, and the prayers to be read on Wednesday in every week during the visitation. Containing forms for morning and evening prayer, and also an "Exhortation fit for the time.'"

"EDINBURGH, *July 12th.*—Proclamation by the Council of Scotland, that on account of the prevalence of the plague in London and other towns in England, all trade or intercourse with the places infected be suspended till 1st Nov., or till the prohibition be removed; that all ships now at sea, ladened with goods from any of the said places, perform quarantine, and that all goods passing by land be stayed on the borders till they have license to pass, or submit to any trial required; and that all goods privately brought in be forfeited; charging all civil officers to enforce these regulations."

"PORTSMOUTH, *July 18th.*—Sir John Mennes to the Navy Commissioners. The sickness is much less at Southampton."

"DURHAM, *July 18th.*—Dr. Guy Carleton to (Williamson). There are seven houses shut up with the plague in Sunderland, one in Wearmouth, and one in Durham, where there is great fear because of the resort of persons from London; now strict watch is kept, and no suspected persons are allowed to enter."

"HAIGH, *July 21st.*—Sir Roger Bradshaigh to Williamson. Is glad to hear of the court being removed from the contagion in London. Confines to their own houses for a month all persons who come from London and those who

entertain them." [The deaths from plague in London during the month of July amounted to 4,127.]

"DOVER, *August 4th.*—Jo. Carlisle to Williamson. The town is free from infection. One house was visited and five died, but none since."

"PORTSMOUTH, *August 6th.*—Portsmouth is at present free from the plague, though fevers and small-pox abound; dreads the appearance of the fatal distemper amongst so crowded and miserably poor a population; it were well to consider beforehand what must be done in case of necessity."

"KNOWLTON, *August 7th.*—Sir Thos. Peyton to Williamson. Asks aid for Wm. Webb, who has a business with Lord Arlington. He lives in London, but in a part free from infection. At Canterbury four houses were shut up, but are all open again; only one person died there last week. The danger is over at Dover, the infected family being removed to the hills. In one country parish the minister's house is infected, but as it stands alone they hope to prevent it spreading. In harvest time it is difficult, without good watches, to keep the people in order. That one parish of St. Giles, London, has done all the mischief."

"IPSWICH, *August 7th.*—J. Knight to Williamson. There is a terrible alarm because Wm. Huggard, surgeon and comptroller of customs, pronounced that the death of two persons has been from the plague. Was entreated by the bailiffs to see whether it was true, that town being the place whence most of the navy provisions are dispatched; sent two experienced surgeons to view the bodies, who declared that it was not the plague. Huggard has a great hatred to the corporation, and will do anything against them, and others join him."

"YORK, *August 7th.*—Sir Wm. Coventry to Lord Arlington. Is sorry to hear his lordship's fear that the plague is gone with the Court to Sarum. . . . . Will conceal the death of the groom's wife at Sarum, lest the people, who are very apprehensive, should fear the like consequence from the Duke of York's coming there."

"DOVER, *August 12th.*—Jo. Carlisle to Williamson. The town is free from the plague, though one house is shut up in it, one at Sandwich, one at Eastry, one at the Earl of Winchelsea's park, one at Westwell, and seven at Canterbury, but only a few are dead."

"ST. GILES, *Sunday, August 13th.*—Sir Thos. Ogle to Williamson. Would have come to Salisbury, but the sickness being there, dares not, for those of Poole, where his company is, scruple to receive any from infected places."

"YORK, *August 13th.*—Sir Wm. Coventry to Lord Arlington. Fears Oxford will not escape in such a concourse of people, the neighbouring villages being infected."

"YORK, *August 14th.*—Sir Wm. Coventry to Lord Arlington. Regrets the breaking out of the plague at Salisbury. It is most dangerous in little towns, where there is less means of avoiding it than in London, especially when every house is full whilst the court is there. The duke is to be feasted by the city to-morrow, and then goes to Hull, the duchess remaining at York, which is still free from plague; it does not spread in the country places, because of strict means taken for separation. At Beverley it did not go beyond the family first infected."

"LONDON, *August 14th.*—James Hickes to Williamson. Has written to the postmaster at Huntingdon to despatch Williamson's letters, airing them over vinegar before he sends them. The post office is so fumed, morning and night, that they can hardly see each other, but had the contagion been catching by letters they had been dead long ago. Hopes to be preserved in their important public work from the stroke of the destroying angel. Will give, as he orders, £5 on his behalf to the poor of St. Martin's-in-the-Fields, but knows not where to get it in this time, where all doubt ever seeing each other again. The sickness increases. Their gains are so small that they will not at the year's end clear £10 of their salaries."

"WOOLWICH, *August 15th.*—Chris. Pett to the Navy Comrs. Planks and deals are wanted. It has pleased God to send the infection of the plague into the town, and two houses are already visited; fears it will be very mortal; will take every care to prevent it spreading to the yard."

"SALISBURY, *August 21st.*—The King to the Bailiffs of Yarmouth. Is much troubled to hear of the continuance of sickness in the town, and the sufferings of the people. Has ordered the Bishop of Norwich to do his utmost for relief of the poor, and to promote benevolence by collections on fast days."

"*August 22nd.*—Henry Muddiman to Williamson. At Salisbury a man died suddenly, and it was suspected of the plague. The King passing by the inn, which was shut up on account of the farrier's death, made a stand, and called to ask the people if they were all well. They said, 'All well'; when he assured them they should want nothing, and he would consider the losses they sustained by their confinement."

"CHATHAM, *Aug. 24th.*—Comr. Peter Pett to Sam. Pepys. Fears the sickness will spread in Chatham."

"LETTER OFFICE, LONDON, *Aug. 31st.* James Hickes to Williamson. There is some doubt of the sickness at Hull and Newcastle."

"*Aug. 31st.*—H. Muddiman to Williamson. Deal, Aug. 28th. Two houses are shut up on suspicion of the plague. Those who died in the *Loyal Subject*, died from calenture." [The number of deaths from plague in London during the month of August was 19,046.]

"PORTSMOUTH, *Sept. 3rd.*—Comr. Thos. Middleton to Sam. Pepys. It is too true that the plague is at Newport, brought over by a certain knight who had an estate there, and sickened and died at his lodgings. The master of the house thought it quinsy, and threatened the mayor for shutting up the house; but two women took the infection and died, from merely changing and airing the sheets of his bed. The poor gentleman was obliged to bury the bodies himself in his own garden; sheep and goats since put in the house are all dead. The plague increases at Southampton."

"EGGLESTON, *Sept. 19th.*—Christopher Sanderson to Williamson. They rejoice that the plague is so violent in London, as the king would otherwise have been more violent against them."

"*Sept. 30th.*—Tim. Gardner to the Earl of Sandwich. Sandwich is already infected with the plague." [During the month of September, 26,230 souls were swept off in London by the plague. The acme of the pestilence there occurred in the week ending the 19th of this month.]

REMARKS ON THE EPIDEMIC FEVER OF SCOTLAND DURING 1863-64-65;

AND ON THE EPIDEMICS OF FEVER WHICH HAVE PREVAILED IN SCOTLAND DURING THE PAST CENTURY AND A QUARTER.

By JAMES STARK, M.D., Superintendent of Medical Statistics, Scotland.

[*Read May 1st*, 1865.]

It is difficult to procure correct information relative to the prevalence of epidemic fever in Scotland in former times, seeing that, till very recently, no general system of registration was in force. It is, therefore, only by referring to the registers of the burial-grounds, to extracts from these published in the periodicals of the day, and to notices of the epidemics in journals, newspapers, and medical treatises, that any information can be procured on the subject. Many years ago I attempted to collect information from these sources as to the years when epidemics of fever prevailed in Scotland; but not being then aware of the importance of ascertaining the exact month when the epidemic appeared, and when it terminated, nor always having the means of determining these points, the following imperfect summary may limit the epidemics to one or two years, when they may have spread over more lengthened periods. These researches were only carried back for a period of about a century and a quarter from the present date.

A virulent epidemic of fever, attending a famine, prevailed in Scotland during the years 1740-41-42; again manifested itself in 1746-47; and again in 1751. How long it continued on these latter outbreaks was not ascertained. A virulent epidemic of fever next appeared towards the close of 1753, and continued till the spring of 1756, or for a period of about three years. Though either one or two epidemics of fever prevailed between this period and 1774, it is not till that year that notice is taken of a very fatal epidemic of fever, which prevailed during the years 1774 and '75. From that period, the mortality from fever seems

to have kept low till 1787, when it again assumed a virulent type, attained its maximum mortality in 1788, but did not materially abate till the year 1790. The next epidemic of fever occurred in the years 1798, 1799, and 1800, and continued for a period of about three years; and epidemics in a much less virulent form reappeared in 1803-4, and again in 1807, 8, and 9. A much more virulent epidemic of fever, however, broke out in the autumn of 1817, and continued till the beginning of the summer of 1820, a period of three years. The next epidemic broke out in October 1826, and continued till the beginning of the summer of 1829, also a period of about three years. A somewhat less virulent epidemic of fever broke out in October 1830, and continued till the beginning of the summer of 1833, also a period of three years. A very deadly and wide-spread epidemic of fever appeared in October 1836, and continued till the spring of 1839, also for a period of about three years. The next epidemic manifested itself in the autumn of 1840, and continued till the beginning of the summer of 1842. A much more virulent epidemic of fever, and of quite a different type, broke out in the autumn of 1842, and continued till the spring of 1845, also for a period of about three years. The last virulent epidemic of fever, before the present one, first manifested itself in October 1846, and continued till the beginning of the summer of 1849, also for a period of three years. A much less virulent epidemic of fever appeared in October 1850, and continued till the spring of 1853, also for a period of three years.

In so far, then, as these imperfect researches go, they seem to indicate that when fever assumes the epidemic form, it has a tendency to continue for three years. They also seem to indicate that, as a general rule, fever usually assumed the epidemic type at the close of autumn, generally in the month of October, and finally died out during the spring months of the third year after its origination. These facts will be found to be of no small importance when we come to consider the probable causes of fever.

The present epidemic of fever in Scotland, began to assume what we are accustomed to call "the epidemic type" during the month of September 1863; that is to say, it began to manifest a decided tendency to spread, and its contagious nature, scarcely noticed before, became strongly developed. I have not as yet the means of tracing the rise and progress of the epidemic over all Scotland, though it was equally prevalent in the rural districts as in the towns,

inasmuch as the register books for 1864 are not yet sent to the head office in Edinburgh. But the progress of the disease can be easily traced in the eight principal towns of Scotland, as the returns from them are received weekly, and the particulars are published monthly in the Monthly Reports. The deaths in these eight towns give, however, a very good idea of the rise and progress of the epidemic in Scotland, as they contain between a fourth and a third of the population of Scotland, and are well scattered over its surface.

To furnish the means of comparison, it may be stated that in non-epidemic years the number of deaths from fever in these eight towns (Edinburgh, Glasgow, Dundee, Aberdeen, Paisley, Greenock, Leith, and Perth) varies from 80 to 90 per month. But in September 1863, the month in which fever assumed the epidemic type, the deaths from fever numbered 123; increased to 129 deaths in October, to 168 in November, to 174 in December, to 183 in January 1864, to 206 in February, and to 224 in March 1864. It has, however, been observed in Scotland that, with the exception of the bowel complaints, all diseases, including epidemics, have a diminished mortality during the summer months. Fever, accordingly, following the same law, caused only 182 deaths in April, 159 in May, 152 in June, 153 in July, 150 in August, and 155 in September. In Scotland, almost all diseases increase in prevalence and fatality with the fall of temperature; and, accordingly, the deaths from fever increased with the cold, so that 162 deaths occurred during October, 233 in November, 244 in December, 275 in January 1865; 281 in February, which was our coldest month, and 289 in March.

In so far, therefore, as the epidemic has yet gone, it has followed in the footsteps of former epidemics. It has commenced at the close of autumn, it has increased under the winter's colds, and diminished under the summer's heats; and it has every appearance of continuing, like them, for a period of three years.

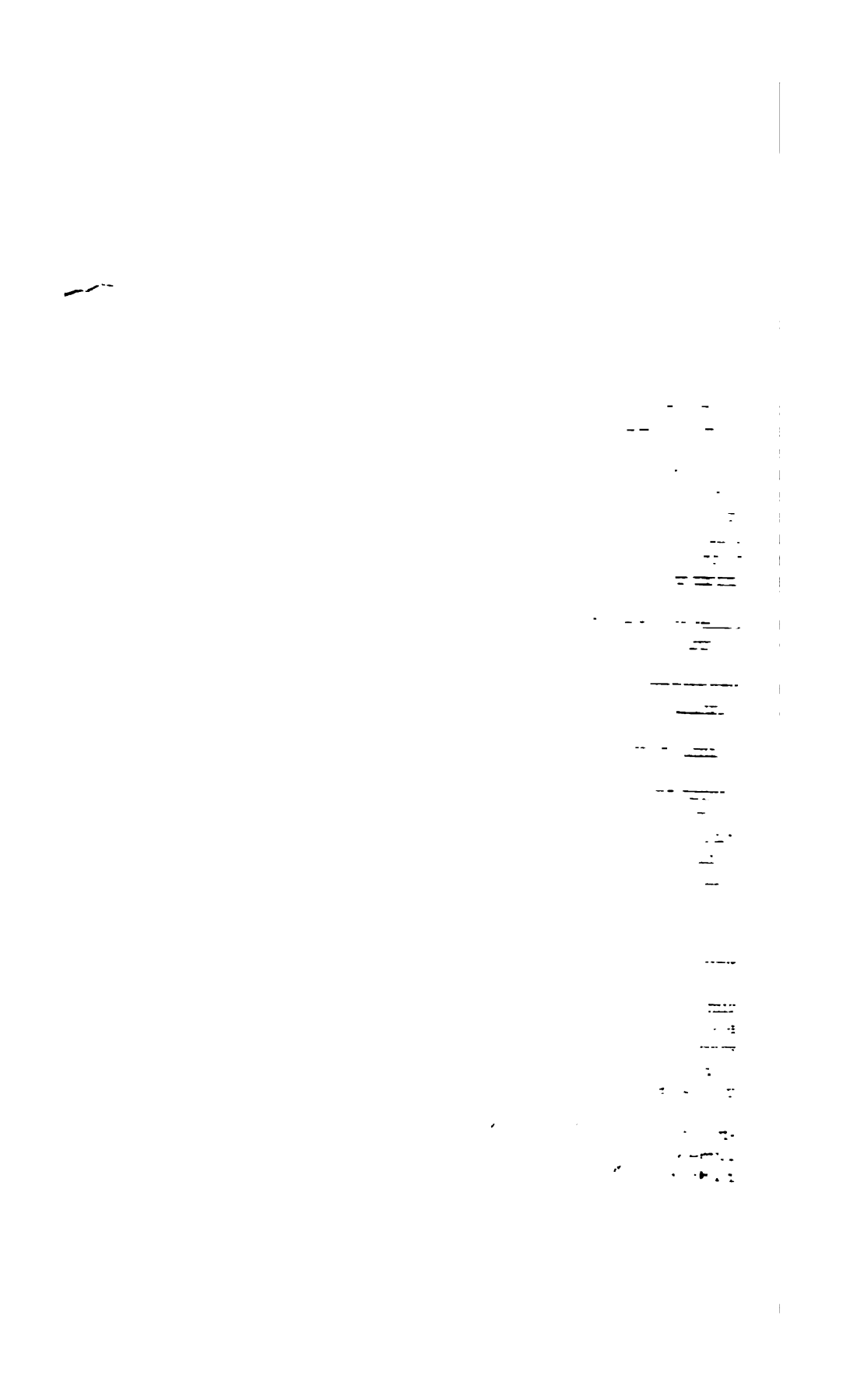
TYPES OF THE FEVER.

In all previous epidemics of which we have accurate records more than one type of fever has prevailed, and the present epidemic has been no exception to this general law; for while pure spotted typhus and enteric fever have constituted the majority of the cases, cases of relapsing fever, of simple continued fever, of gastric fever, and of febricula, have not been few.

But it is useless to talk of types of fever unless we distinctly understand one another as to the names and definitions which we shall assign to each form. The older nosologists divided the continued fevers into synochus, synocha, and typhus, but their definitions of each of these were so imperfect, that we cannot now recognise what disease they meant by each of these names, even the similarity of two of these names leading to confusion. Modern nosologists have, therefore, been forced to invent new names and try their hands at characteristic definitions for each form; and time alone can reveal whether the new names and definitions will answer the purpose to our successors better than those of the older nosologists to us.

Modern nosologists incline to regard each form of fever as a distinct species. This is, I think, a mistake. They appear to me to be only distinct varieties; and in every epidemic numerous cases occur which it is quite impossible to refer with certainty to any of the forms, as they seem to partake of the characters of more than one, and sometimes actually pass from the one to the other. Whether, however, we consider them as distinct varieties, or separate species, it is absolutely requisite for the sake of the medical science that we should be able to distinguish the one from the other; therefore, till the Royal College of Physicians, or some other authoritative body, gives us better definitions of each form, I would beg to submit to this Society the following names and definitions for each form of fever. It would greatly facilitate medical investigations into the nature of epidemic fever if the medical profession when they give certificates of the cause of death, would make use of the first names herewith given to each form, in order to have an uniformity of nomenclature over the kingdom. The names have been chosen with a view to their dis-similarity; as constant confusion arises from the use of similarly sounding names—as synochus and synocha, or typhus, typhoid, and typhinia. In speaking of the rashes or eruptions characterising each form, petechiæ and vibices are not included; for though it has been proved that the rash of typhus passes into petechiæ, they are sometimes present in severe cases of other forms of fever.

1. *Typhus fever* (also called spotted fever, low, putrid, brain, and nervous fever.)—A continued fever, characterised by great prostration, and a mulberry or measly rash appearing early on the skin (*but not in successive crops*) and generally remaining visible during the course of the disease. Bowels generally confined.



had not been described by the older physicians. This was simply a mistake. It was no new form of fever, but one of the very oldest forms of fever which ravaged this country and Ireland during the last century, and likely for centuries before that. The dreadful famine fever which ravaged Scotland and Ireland a century and a quarter ago, viz., from 1740-42, was as essentially a relapsing fever as the notorious recent famine fever of Ireland of 1846-49, for it is recorded of the cases that "the patients were subject to relapses even to the third and fourth time." The fevers of the last century were described too imperfectly to enable us to trace how often this form of relapsing fever appeared among the epidemics; but the relapsing fever was recognised as constituting no small proportion of the cases in the epidemics of 1798-1800, in that of 1810-11, in that of 1817-20, in that of 1826-29, in that of 1841-42, in that of 1846-49, and has even appeared in the epidemic at present prevailing over Scotland. Nay, more, according to the accounts which have reached us from Russia, it constitutes a large proportion of the cases of that virulent epidemic which is at present devastating that country.

Here, then, we have the same type or form of fever reproduced again and again, and remaining absolutely unchanged, during at least a century and a quarter; disappearing for a few years, then all at once again constituting no small proportion of the cases in the epidemic, of which it forms a most characteristic part.

This relapsing fever, however, did not cause the other forms of fever with which it was associated, to change their types, neither did it absorb all the types of fever in these several epidemics. Maculated typhus, as it was then called, maintained its character, and its mortality, as absolutely unchanged in the epidemic of 1740-42 as it did in the epidemic of 1863-65, and as far as can be traced seemed to constitute about the same proportion to the relapsing fever as in our famine fever of 1846-49.

This fact is quite fatal to the idea of any true change of type; that is to say, it is quite fatal to the idea that typhus changes to relapsing fever or relapsing fever to typhus. Did fevers really change their type in that sense, then the new form would suppress and take the place of the old forms. But in no epidemic of which we have the particular description left us has this occurred. Mr. Muir informs us that in the fever at Paisley in 1831 "one fourth of the whole number relapsed," and by his description half of the remainder

were pure typhus, the other half enteric fever. In the epidemic of 1846, of 1800 cases treated in the Royal Infirmary, Glasgow, 777, or less than half of the cases, were relapsing fever, 500 were unmodified typhus, 130 were enteric fever, 158 were simple continued fever, and 16 were febricula. The Glasgow physicians, to their honour be it said, appeared to have early recognised all the distinct forms of fever—long indeed before their brethren in the east.

No form of fever has been so much overlooked in Scotland as enteric fever. According to Dr. Christison, in his address to the Social Science Association at Edinburgh, one case which was recognised in the Royal Infirmary of Edinburgh in 1847 caused great excitement, but it would appear that it was not till 1860 that the cases of enteric fever began to be distinguished in that institution. That circumstance, however, did not prove enteric fever to be a new form or type of fever in that part of the world; it only proved that till that period it had been confounded with typhus. Dr. Alison's report of the cases of fever treated by him in the Royal Infirmary so early as 1826-27 prove that fact; for of 342 cases of fever treated by him, 35 had abdominal affection, characterised by diarrhœa and abdominal pain, clearly proving that the cases were enteric fever; for at that time no attention was paid to the eruption, nor till the publication of Dr. Peebles' paper in 1835, when he drew attention to the exanthemous nature of typhus. But even the dissection at the Royal Infirmary proved that many cases of enteric fever must have been treated there for typhus, for of 101 dissections of fever cases by Dr. Home, in 29 cases the glands of Peyer were found well defined and enlarged, and in 7 were ulcerated, the ulcers having in many cases perforated the peritoneum.

Even when enteric fever was unrecognised in Edinburgh, perhaps because it was not so common, according to Mr. Goodsir, it was almost the only form met with in Fife; and Dr. Perry excellently characterised it in Glasgow, in his able reports on the fever of 1831-32, directing special attention to the affection of the Peyerian glands. But Dr. Perry's remarks were singularly corroborated by a Berlin physician, who had seen enteric fever in his own country, and who visited medically the Royal Infirmary of Glasgow in 1836. He writes of the fever cases: "By far the greater number of the patients laboured under an abdominal typhus, which is called in France *fievre typhoide dothinenterite;*" and he remarked that even an observer of a few days could easily

satisfy himself of the nature of the disease, "as many of the patients died of peritonitis, the consequence of perforating ulcers of the Peyerian glands."

Dr. Cheye recognised enteric fever as constituting a considerable proportion of the cases in the epidemics of 1799-1800, of 1810-11, and of 1826-27; only he styled the fever "gastric fever". But he left no doubt as to its being what is now termed enteric fever, because he describes the diarrhœa and the abdominal pains, as well as the perforating ulcers of the Peyerian glands. But the same enteric fever formed no small portion of the cases in the epidemics of 1832 and of 1837; for it is remarked "the fever which prevailed in Dublin in 1832 was the gastric fever of Pinel, or gastro-enterite of Broussais; and in 1837 it was remarked that "typhoid fever predominated."

There cannot be the slightest doubt that the enteric form of fever occurred in many of the epidemics of the last century; for it is remarked of many of them, that they were attended with obstinate diarrhœa. In Scotland, however, this form of fever has been too much overlooked; so that, were it not for occasional allusions to the persistent diarrhœa and the abdominal pain, and for the *post mortem* examination, in which the aggregate glands of the ileum were found ulcerated, we should not have known, as I have now satisfied myself was the case, that enteric fever constituted part of the epidemics of 1799-1800; of 1810-11; of 1826-27; of 1836-39; of 1846-49; and possibly of others.

Pure unmodified typhus has always constituted from a third to a half, or even to two-thirds, of every epidemic which has ravaged Scotland. It showed this peculiarity, however, in days long since gone by, that when it attacked a population previously weakened by famine, and by the little food they could procure chiefly consisting of salted and preserved articles of diet, it often put on the characters we now assign to plague,—it proved fatal in a few hours; and the worst cases were even attended with buboes and carbuncles. Even, however, when it assumed this form—the black death of the fourteenth century—the great mass of the cases were those of typhus in its more severe forms.

From the facts now mentioned, it thus appears that, in every epidemic of fever, nearly all the varieties of fever occur; but, at the same time, it would appear that every several epidemic has its own special characteristics from one or other form of fever predominating.

The epidemic at present devastating Russia is a good

example in point. According to the accounts already received, it consists in part of pure typhus in its worst forms; in Siberia, it is said, running occasionally into the form of the black death, with death in a few hours, and in others with buboes and carbuncles; in part, also, composed of the relapsing fever, with all the symptoms which attended the Irish famine fever, 1846-49.

The epidemic of fever at present prevailing over Scotland has been no exception to that law which we have just seen appears to regulate all epidemics of fever, for every form of the disease has been met with during its continuance. Thus, typhus or spotted fever, enteric fever, relapsing fever, simple continued fever, and febricula have co-existed in the same locality.

But a very remarkable fact has been observed in Scotland, and that is, that the same type of fever does not prevail in each locality; for while one form seems to take the lead in one locality, another and a very different form seems to take the lead in another. This fact deserves special notice, seeing that it seems to prove that, if we admit that epidemics of fever are chiefly owing to general—say atmospheric—causes, we must also allow that local causes must have a strongly modifying agency, causing the fever to assume a type in one place different from that in another.

Thus, of the 440 cases of fevers treated in the Royal Infirmary of Edinburgh in 1864, 212 were cases of pure typhus, 140 were enteric fever, while 88 were simple continued fever and febricula. The fever of Edinburgh may therefore be characterised as being of the enteric type. In the Royal Infirmary of Glasgow in 1864 where enteric fever is also recognised, of 2190 cases of fever 2150 were reported to be cases of typhus fever, while only 40 were cases of enteric fever. The epidemic of Glasgow was, therefore, one of nearly pure typhus. In the Aberdeen Royal Infirmary not a case of enteric fever was observed, for in 1863 of 396 cases 387 were pure typhus, and 9 febricula; and in 1864, of 926 cases, 897 were pure typhus, and 29 febricula. In the Royal Infirmary, Dundee, of 355 cases of fever treated in 1864, 318 were typhus, 16 enteric fever, and 21 febricula; in these two towns, therefore, the leading type was typhus. Perth is not very distant from Dundee, yet the type of fever there prevailing was as different as possible, seeing that of 280 cases of fever treated by the medical practitioners there from 1st August 1863 to 30th April 1864, 162 were cases of "gastro-enteric or

typhoid fever," only 46 were pure typhus, 59 were simple continued fever and febricula, while 18 were cases of relapsing fever. Almost every form of fever, therefore, appeared at Perth, although enteric fever was the leading form of the epidemic. Specific returns have not been received from the other towns, so that I cannot say what special type prevailed in each.

MORTALITY OF FEVER.

The hospital statistics of fever, taken for a large number of years, indicate that in Scotland the ordinary mortality of fever is about 12 per cent. of the cases treated, or about one death in every eight cases. During the present epidemic, the general mortality of fever over the country would seem to be very similar, although the mortality in different towns, and even of different hospitals in the same town, has varied to a large extent. Thus, the mortality of the fever cases in Glasgow varied from 9·8 per cent. of the cases treated in the Govan Parish Hospital, to 13·5 per cent. of the cases treated in the Royal Infirmary. In the Royal Infirmary, Edinburgh, only 7·7 per cent. of the cases died, though such a large proportion consisted of enteric fever. In the Greenock Hospital 14½ per cent. of the cases died; but in Port Glasgow, only 10 per cent. In the Royal Infirmary of Aberdeen, and in that of Dundee, the deaths from fever amounted to 10½ per cent. of the cases treated; while in Perth, though the majority were cases of enteric fever, only 9 per cent. proved fatal.

But the mortality of the different forms or kinds of fever was most diverse in the several towns. Thus, in Edinburgh, of the 140 cases of enteric fever in the Royal Infirmary, only 13 died, or at the rate of 9·2 per cent. of the cases treated; while in the Royal Infirmary of Glasgow, of the 40 cases of enteric fever, 15 died, being at the rate of 37·5 per cent. In Perth again, of 162 cases of enteric fever, only 10 died, that is 6·1 per cent.; while in the Royal Infirmary of Dundee, of 16 cases of enteric fever, 3 died, being at the rate of 18·7 per cent.

These facts would seem to indicate a far more remarkable change of type than that to which medical practitioners have hitherto been exclusively directing their attention; for they seem to prove that whenever enteric fever constituted only a *small* proportion of the cases, as in Glasgow and in Dundee, its mortality is very high indeed—in Glasgow 1 death in every 3 cases; whereas, when it constitutes

the leading type of the epidemic, as in Edinburgh and Perth, its mortality falls to the average of ordinary fever.

I am not aware that this fact has ever been previously pointed out; yet it would seem that its truth is borne out by the statistics of enteric fever on the continent of Europe, where it seems to be the prevalent form of fever, the mortality of many epidemics not exceeding 10 and 12 per cent.

This is a most striking fact, because it of itself knocks on the head that most unlikely theory that enteric fever is a new phase or type of fever, not met with in this country till within a comparative limited number of years. That theory derived its chief support from the fact that of late years, when it was recognised as a distinct form of fever, it has only constituted a small proportion of the cases met with, or more likely only its severer cases were recognised, and when so recognised its average mortality was about one death in every three cases. From that circumstance it was inferred that it never could have previously occurred as an epidemic, else its high mortality, equalling that of cholera, would have caused special attention to be paid to it. But all such reasoning, and all such conclusions are shown to be false by the facts above stated; because it was seen by them that when enteric fever constituted the leading type of the disease, its mortality fell to that of the ordinary epidemics of fever—as was evidenced by what occurred both at Edinburgh and Perth. Enteric fever may, therefore, have been the leading type in many former epidemics of fever without its mortality causing any special notice to be taken of it; and we know that even yet many medical practitioners are unable to distinguish it from typhus.

Typhus fever itself to no small extent exhibits in its mortality that which has just been shown with regard to enteric fever; though in the present epidemic its mortality in different parts of the country has been much more uniform than that of enteric fever. Thus, in the Royal Infirmary of Edinburgh, of 212 cases of typhus fever, 20 died, being 9·9 per cent. of the cases. In the Royal Infirmary of Aberdeen, of 897 cases of typhus fever, 97 died, or 10·8 per cent. of the cases. In the Royal Infirmary of Dundee, of 318 cases of typhus, 35 died, or 11 per cent. In the Towns Hospital, Glasgow, of 549 cases of typhus, 67 died, or 12·2 per cent. In the Royal Infirmary of Glasgow, of 2150 cases of typhus, 283 died, being 13·1 per cent.; while in Perth, of 46 cases of typhus, 16 died, being in the large proportion of 1 death in every 3 cases, or 34·7 per cent. of deaths.

This fact, then, relative to Perth, seems to show that even pure typhus fever, when it becomes the exceptional form in the epidemic, may assume a virulent type;—just as it was seen happens with enteric fever when it constitutes a small proportion of the epidemic.

But the fact that typhus itself assumes a more virulent type and a higher mortality when it constitutes the smaller proportion of the epidemic, has been witnessed again and again in this country, though hitherto the fact has been overlooked. Thus, in the epidemics of 1847-49, where relapsing fever was the leading form of fever, of 1323 cases of fever treated in the Royal Infirmary of Edinburgh, only 539, or 40 per cent., were cases of typhus fever, and of these 111 died, being no less than a mortality of 20·6 per cent., or double the mortality of typhus when it is the leading form of the epidemic. This was not an exceptional case; for the same occurred at Glasgow and other places. Thus at Glasgow Royal Infirmary in 1847, of 4916 cases of fever, 2399 were typhus fever, and of these 510 died, being a mortality of 21·2 per cent.

The above instances with regard to enteric and to typhus fever would, therefore, seem to indicate that when they become the leading form of the epidemic their mortality is much lower than when they occur as the exceptional cases, as it were, in the epidemic. But as might be expected the rule is liable to numerous exceptions.

In the present epidemic the cases of relapsing fever have been too few to afford any indication of the mortality resulting from that form of fever. From 3 to 5 per cent. of the cases died in the epidemic of 1847-49; but the suffering from the disease was great, and the convalescence long protracted.

Of the simple continued fever, the mortality in the present epidemic has not exceeded $1\frac{1}{2}$ per cent., and no deaths have occurred from febricula.

The subject of the contagious nature of fever is too extensive to take up in this paper, but I trust I shall shortly be able to submit my views regarding it to this Society. In the meantime I would take the liberty of directing the Society's attention to some facts which bear strongly on the subject, published by me in my Report to the Registrar-General of Scotland, which is just issued. *Seventh Detailed Annual Report of the Registrar-General of Scotland*, p. xl.

In conclusion it may be remarked, that the above facts show that we have yet a great deal to learn relative to

epidemics of fever. Above all, we want a large collection of well ascertained facts as to the exact number and proportion in which each of the several forms of fever occur in every epidemic, and the mortality attending each form. Even the figures given in this paper must be considered as mere approximations; for though every care has been taken to ascertain whether the medical practitioners who furnished the returns used the same names and definitions as those given in this paper, and only those were made use of which did so correspond; yet, from finding that numerous hospitals existed where no attempt was made at distinguishing the several forms of fever, a doubt was left on the mind that even in the instances adduced only the more distinctly defined cases were properly designated.

Taking, however, all the facts as they are, they seem to indicate that the leading form of fever, and the mortality of each form, may be widely different in places even closely adjoining. It is therefore very desirable that the Epidemiological Society should urge on the medical profession the desirability of a correct nomenclature in fever; and if the Society is not satisfied with the definitions of the forms of fever now submitted, would appoint a Committee to substitute better definitions and make them known to the profession.

"ON SCARLATINA RHEUMATICA, VEL ARTHRITICA" (COPLAND): BREAK-BONE FEVER, OR "DENGUE."

By Dr. SMART, Deputy Inspector-General, Royal Navy.

[*Read June 5th*, 1865.]

Within the epidemic range of yellow-fever, there is a febrile disorder, known as "break-bone fever," and "denguè" (*deng-ga*).

Its characteristic peculiarities are severity of accession, combination of skin eruption with rheumatic pains, and harmlessness of result. It has been known to accompany yellow-fever in epidemic seasons, holding then a somewhat analogous relation to that which diarrhœa holds in epidemics of Asiatic cholera.

There are grounds for suspicion that a ship, possessing bad hygienic conditions, brought within an epidemic of denguè, may get the true type of yellow-fever developed in her.

Thus the U.S. sloop-of-war, *Hornet*, having a constantly damp atmosphere between decks, from previous saturation of her timbers, her holds being at the same time in a dirty, unwholesome state, cruised in the West Indies and Gulf of Mexico, in the summer of 1828, without touching at any port at which yellow-fever prevailed. In September she was lying at Sacrificios, three miles from Vera Cruz, where denguè was the only known epidemic disorder; and, while there, the yellow-fever broke out among her crew.

In July, 1864, yellow-fever became epidemic at St. George's Island, the eastern of the Bermuda group; a month later malignant cases appeared on Ireland Island, at the other end of the group. In the interval, fever of the denguè type was prevalent.

A professional eye-witness, Mr. T. Wilson, of the R.N. Hospital, wrote to me, dated 23rd September, 1864, thus:—"During July, many cases of fever, presenting symptoms precisely similar to those looked upon as characteristic of the broken-bone fever, came under treatment at the Naval Hospital on Ireland Island. In the beginning of August,

the fever cases presented symptoms of a more aggravated form, but the same in kind. On the 11th August, a case was admitted, resembling at first the other fever patients; but, after two days, it presented more serious characters, ultimately assuming those of true yellow-fever, and ending fatally on the 19th of August; this being the forerunner of a most severe epidemic."

With these facts before us of doubtful relationship between denguè and yellow-fever, it will be useful to re-examine what knowledge we possess of the characters of the former.

GENERAL HISTORY OF THE DISEASE.

Dr. Copland considers it to have first shown in epidemic form at Rangoon, in Burmah, in 1824, and to have spread widely thence over India in 1824-25. He states that in the autumn of 1827 it raged with great severity in the Island of St. Thomas, in the West Indies, which has become in our day the worst nest of yellow-fever. Dr. Wood states, in his *Practice of Physic*, that the late Dr. Rush described it as an epidemic of the year 1780 at Philadelphia—"break-bone fever," classed by Dr. Rush "bilious remittent;" and, further, on the authority of Dr. Waring, that it became epidemic at Savannah, in Georgia, in 1826, one year earlier than the outburst at St. Thomas's, noted by Dr. Copland.

All concur in that it became a general epidemic of the Southern United States in 1828.

The Denguè at Bermuda.—The records of the Naval Hospital allude to it as "the epidemic catarrhal fever which prevailed here in the autumn of 1828, and was very general over these islands during the yellow-fever epidemic of 1837," since which it has been epidemic in 1860 and 1863. I think that scarcely a summer passes without cases of this peculiar fever, and that the "ephemera" of non-epidemic seasons differs nothing from the milder cases, that is, from the majority of the attacks in a denguè epidemic. I can believe that there are endemic causes of this malady, constantly productive of scattered cases, and that epidemics occur through aggravation of those endemic causes, or through the coincidence of other latent influences which render the community at large more susceptible, and then in the multiplication of attacks, there will be found extreme morbid actions, not seen except under this combination of causes.

GENERAL CHARACTERS OF AN EPIDEMIC OF DENGUÈ.

At Bermuda, under ordinary circumstances, an attack of febrile indisposition following on insolatio, exposure to cold and wet when heated, prolonged watching, or chylopoietic disturbance, is attended with chills, intense headache, severe pain in the eyeballs, injected intolerant eyes, rachialgia, flushed skin, and frequent hard pulse, which symptoms disappear on sweating, during heavy sleep, leaving the patient inapt for exertion from a more or less general soreness of the body and stiffness of the limbs.

This is the "synocha ephemera" of the climate, met with at all seasons, but most frequently in spring and summer.

An epidemic of dengue will probably consist, in four-fifths, of cases scarcely varying from these; but the other fifth will consist of cases in which the disorder of system is prolonged with symptoms of depressed nervous power, weak, slow pulse, and a disposition to congestive stasis of the blood in the dermal capillary system; sometimes also in the lungs, with tendency to epistaxis and vibices. A sprinkling of such cases will suffice to characterise an epidemic of dengue just as a few cases of blood stasis on the gastro-intestinal surface, occurring in the metaptosis of febrile action, ending by hæmorrhage, ejected as black-vomit will give the name of "yellow-fever epidemic" to a widely-spread visitation of fever, in which, at the utmost, a tithe only will reach the climax indicated by that usually fatal symptom.

Cause.—The specific cause of this disease, like those of yellow-fever, influenza, and cholera, may continue beyond our reach; but we may hope to know the secondary, or developing influences, without which these diseases do not arrive at epidemic intensity. Even the developing influences are to be inferred more from negative than from positive evidence observed in the growth and decline of epidemics.

It may be asserted that dengue assumes epidemic form in summer or autumn among men living in crowded barracks and ships; it adheres to locality, a change of which after an epidemic has begun, exempts those in whom the disease is not incubating; its outbursts are marked by the simultaneous attack of several persons; its track displays a larger ratio of severe cases in the ascending than in the descending half of its continuance. In the wards of a well-ventilated hospital, filled with mixed cases, it does not extend disproportionately

to its course without; the immediate attendants on the sick are not more liable to attack than others; previous attempts do not exempt, and relapses are frequent.

The suddenness of invasion in many adults, and the occurrence occasionally of convulsions as a first symptom in some children, indicate a rapid impression on the nervous system, too rapid, it seems to me, to admit other explanation than that of the respiratory introduction of a blood-poison, which can scarcely be attributed to the persons of the diseased, as there is no increased liability of sick in hospital, or of nurses.

Prophylaxis.—For these reasons, it appears that the best rules to avoid the influence of the essential cause of denguè, are to dwell as much as possible in the open air, avoiding confined spaces, especially at night, when the resisting force of the system is at its minimum, and, of all places, localities in which the disease has assumed epidemic intensity, preferring direct intercourse with the sick removed from those localities to entrance into the places where they were first attacked. And, in order to neutralise secondary influences, it is necessary to maintain the nervous force by avoiding indulgences that ordinarily tend to exhaust or to weaken it, and to employ nervine tonics, such as quina and iron, when under more than ordinary exposure.

Topography.—The localities of chief interest, as regards this epidemic disease, are the military stations.

1st. Head-quarters at St. George's.

There is defective sanitary arrangement, in want of barrack-rooms for the married soldiers and their families.

These poor people are found scattered in the most wretched hovels in the by-ways of a dirty town, mixed up with the coloured population. Cleanliness is impossible to them; and filth accumulates and produces disease, where cess-pits bored in a porous rock are the only receptacles of ordure.

An effort is now being made to remedy this sanitary defect, by building cottages in an open field for the soldiers' wives and children to dwell in. This sanitary measure will react on the health of the entire body of troops quartered at St. George's, especially in epidemic seasons, as this dependency of the barracks will be brought under military supervision, and become a less frequent focus of disease.

2nd. Station at Hamilton, the chief town on the shore of a land-locked harbour.

It has been generally found that diseases find lodgment in

those barracks, and in such cases the practice has been, since 1853, to encamp the men on Prospect Hill.

3rd. The military station at Ireland Island, for the immediate protection of the naval arsenal.

There the barracks, being casemated inside the fortifications, are badly ventilated, and it has been found on several occasions that an epidemic once located in them is difficult of eradication. The health of the troops is found to be much benefited in summer by encamping on the glacis. The married quarters are in a bastion, where they have no thorough ventilation, and the rooms are greatly exposed to the direct rays of the sun.

These homes are not, in my opinion, so good as they might be made, but as sanitary measures would be at variance with the military necessities of the bastion, the families should be removed elsewhere.

The Dockyard population dwelling outside the walls, are placed under exceedingly good sanitary conditions, in roomy, well ventilated, well watered, and sewered houses, with detached ashpits. As a result of this liberality of the Admiralty, a more healthy community is rarely to be seen anywhere, which condition will be secured by extending accommodation of the same kind commensurate with increased establishment.

The Naval Hospital is situated on the same island, at sufficient distance from the town for segregation. It is thoroughly ventilated, and supplied with rain water, collected in tanks from its slated roofs.

Many improvements have been introduced within the last four years, which will doubtless tend to perfect this sanitarium; but no means have succeeded in rendering the sewerage what it ought to be, and, until that is effected, the efficiency of the hospital cannot be complete.

The outer anchorage of the dockyard is freely exposed to the prevailing summer winds, so that ships lying there are placed as advantageously as they can be in any tropical harbour.

The Quarantine Stations are on detached islands, not less than two miles from the more thickly-populated centres.

Frequent interchanges of troops are made from headquarters to the outposts, and seamen on leave from their ships at the dockyard, are sent to Hamilton or to St. George's when yellow-fever is not present.

Nomenclature.—Dr. Copland has named this disease, "scarlatina rheumatica" vel "arthritica," deriving this de-

signation from two of the prominent symptoms, skin eruption, and muscular or articular pains.

The disease has not either the incubation, course, complications, or sequela of scarlatina, or the lactic diathesis and the excess of fibrinous element in the blood which characterise rheumatism, from which it differs entirely in its complications and results. The adoption of a designation so inadequate, by this great authority, serves to show how little is known of this disease.

The most frequent diagnostic feature, a peculiar falling of the pulse on the subsidence of the first stage is, I think, the proper ground for nosological classification. It appears to have some resemblance to yellow-fever in its metaptosis, or change of type at that stage.

Dr. Copland has brought fully into view this peculiarity as characteristic of the epidemic, and he has impressed the fact of the primary and secondary stages of fever being defined by the state of the circulating force. In some visitations, as in the two last at Bermuda, the fever symptoms ceased altogether with the primary stage, and no change of form succeeded to it in the majority of cases.

The symptomatology given by Dr. Wood is more concise than that by Dr. Copland, and it scarcely admits of any improvement.

I shall now detail the prominent features of a well marked case or two, showing the type and course of the disease.

My first case seen on the 1st of May 1860, was succeeded by scattered cases until the end of July, when the disease became suddenly epidemic in the Hamilton barracks.

With reference to four cases which occurred in May and June, 1860, there is this observation in the hospital return for the quarter:—

"There have been four cases of remittent fever, of a few days' duration, originating here, in which there has been a very remarkable depression of nervous power, together with sedative influence on the circulation, the pulse, in some cases, having been as low as 50 or 48, with signs of congested lungs. In three of them diarrhœa was a prominent symptom in the first stage of the fever. In addition to three cases entered as intermittent fever, there have been four attacks of ague in men under treatment in hospital for ulcer. Their ship, H.M.S. *Nile*, has come direct from Plymouth. They had not ague on board their ship. The inference is that their debilitated systems have resented some morbific causes existing endemically here."

I was of opinion at that time that these cases were all of endemic malarious origin, and the cases of tertian fever referred to, proved the existence of miasmata.

The epidemic broke out about the 1st August among the soldiers quartered at Hamilton. The attacks were so sudden and numerous, and attended with so much prostration, that the alarm of yellow-fever took possession of the public mind. The disease increasing in the barracks, the troops were encamped on a high hill, half a mile from the town; subsequent to which, I believe that no new cases showed among them, while the disease continued in other localities as late as November.

To exhibit the diversity of the extent of symptoms in the same epidemic, a case of mild form may be usefully contrasted with one of a severe type occurring at the same time in the same locality.

Case of mild form of the fever.

William Hannon, private soidier, was admitted into hospital from Hamilton Barracks, on the 4th of August, 1860. He had been ill four days; slight chills, followed by pyrexia, with pains in head and limbs, and nausea.

Fifth day. On admission he suffered headache, painful sense of weight in eyes and orbits, tongue dryish yellow-furred, bowels opened, skin warm and perspirable. Pulse 68, natural force, being then in a slight remission.

Sixth day. Had slept and sweated, orbital pains, excited papillæ of tongue, bad taste. Pulse 70. Perspired through the day.

Seventh day. Apyretic. No complaint of pain; tongue excited. No diarrhœa.

Eighth day. *Apyretic.* No complaint of pain; bowels opened naturally; *skin cool, but marbled of darkish hue. Pulse* 60, *weak.*

Ninth day. Apyretic. Fauces injected; bowels regular. Pulse 72.

Tenth day. Convalescent.

The true relations of this case cannot be doubted; the yellow tongue, the orbital pains, the state of surface and pulse on the eighth day are unmistakeable symptoms of the disorder.

Case of severe form of fever.

Daniel Madden, age twenty-five, private soldier, admitted to hospital from Hamilton Barracks, on the 4th August, was taken ill on night of 31st of July, with slight rigors, nausea, and headache, pains in limbs, &c. When admitted on the

fourth day, he had—pyrexia, headache, pain across front of chest, hot skin, flushed face, injected eyes, deafness, pulse 80, soft dryish furred tongue, and constipated bowels; vomiting, with tenderness of abdomen.

Fifth day. A morning remission, with moist skin. Vespere. Exacerbation; surface bright red, and secreting irregularly; tongue white at centre, red at tip and edges.

Sixth day. Restless night from vomiting, and purging of dark thin stools, tenderness in right iliac fossa, tongue red-edged, skin hot, bright-red tinted, eyes injected. Pulse 68, and full.

Vespere. Seven or eight frothy dark stools, skin hot, perspirable. Pulse 86, full, soft.

Seventh day. Slept well; has great lassitude, with frontal headache, diarrhœa, surface bright marbled, perspirable; face flushed, eyes injected red, fauces red, tongue thickly yellow-furred red-edged. Metaptosis.

Vespere. Sleeping soundly.

Eighth day. Slept and sweated through night, no diarrhœa, no pain in head or back, face flushed, surface rubeoloid cool and moist. Pulse 68, not full.

Vespere. No exacerbation, bowels loose.

Ninth day. Apyrexia. Surface rubeoloid, cool and damp; injected eyes and fauces. Pulse 62, feeble. Tongue furred at base.

Vespere. No exacerbation, bowels loose.

Tenth day. Apyrexia. Rash less vivid. Pulse 60, of good force. Tongue yellow; bowels not loose.

Eleventh day. Apyrexia. Eruption faded, tongue excited but clean, no diarrhœa. Pulse 56, feeble.

Twelfth day. Convalescent.

The case of Madden is interesting in being one of the earliest epidemic cases. The remittent type, the metaptosis on the seventh day, the rubeoloid surface, and the falling pulse supervening on it, were well marked in its course.

Previous to the metaptosis, there existed scarlatinous eruption, excited circulation, and gastro-enteric disorder, with excessive secretion of vitiated bile. After it, the eruption assumed the rubeoloid form, and passed away in four days, the pulse fell gradually to 56, with a venous injected sclerotic, indicative of the debility of the capillaries; the biliary secretion seemed to intermit as the diarrhœa became irregular.

Case of severe form of denguè.

John Slaney age twenty-one, private soldier, admitted from

Hamilton Barracks, 6th August. He was attacked on the 3rd with pains in the head and limbs, and complained on the 4th of pyrectic signs. Is still suffering from those pains, with prostration, thirst, vomiting, yellow furred tongue, and dry skin.

His face is scarlatinous, and over the sternum and pit of the stomach some dark maculated patches are observed. Pulse 76 full and soft, bowels confined, no tenderness.

Vespere. Easier from pain, sweating. Pulse 82, full, soft.

Fifth day. Slept and sweated; morning remission; surface warm, perspirable, face flushed, tongue foul, bowels costive. Pulse 74, full.

Vespere. Pyrexia; sweating. Pulse 84, soft; gums turgid and bleeding; mercurial fœtor.

Sixth day. Slept badly, did not sweat at night; pyrexia; flushed face, red eyes and fauces, skin hot and dry, rubeoloid over chest, tongue yellow with red point, bowels loose, of thin, pale, stools; general soreness of abdomen.

7 P.M. *Vespere.* Pyrexia; skin hot, flushed, and sweating. Pulse 88 soft; loose evacuation.

9 P.M. Skin hot and dry, eye red and bright; epistaxis during sleep, livid gums; metaptosis.

Seventh day. Face flushed, eye pale, epistaxis, surface cool, a distinctly papular rash scattered on the body, headache relieved.

Vespere. Epistaxis; skin warm and moist. Pulse 68, soft, diarrhœa slight tenderness.

Eighth day. No headache; less rachialgia. Pulse 66, soft; a bright rubeoloid eruption on trunk, arms, and thighs; diarrhœa, bilious and watery; epistaxis has ceased.

Vespere. Surface, cool and moist. Pulse 68, soft.

Ninth day. Rubeoloid eruption declining on face trunk and arms, but from nates to ankles bright red with distinct white patches of irregular shape. Pulse 64, not full or strong; diarrhœa.

Tenth day. Slept well; tongue cleaner, anorexia; surface of trunk pale, with marbled paler spots; that of legs has vivid rubeoloid eruption. Urine not albuminous.

Eleventh day. Cool surface; trunk and arms free, but the legs present pale spots on a dusky-red base, as if chilled. Pulse 52, of good force; tongue coated.

Twelfth day. Completely apyretic. Pulse 56, weak, when recumbent; surface of legs as before.

Thirteenth day. Convalescent. Pulse 66 recumbent; 104, small, erect.

Fourteenth day. Redness has nearly disappeared, but distinct white patches are still visible.

Eighteenth day. White patches, visible yesterday, have disappeared since, after warm bath.

Nineteenth day. Gastric disturbance.

Twentieth day. Signs of hepatic fulness of blood.

Twenty-second day. Free from symptoms of disorder.

The case of Slaney is still more distinctive in its nature than that of Madden. The great feature, the metaptosis, occurred in this case, also, on the seventh day. Previous to it there had been scarlatinous rash of face and neck, with dark maculæ more like rubeola on trunk, the circulation was excited, the gastro-hepatic function was deranged, and the hæmorrhagic tendency displayed itself in lividity and turgidity of the gums, and in epistaxis. After it the rubeoloid form of eruption became general, fading first from the trunk and parts nearest the centre of circulation, and last from the lower extremities, where, after the eleventh day of the disease, it lingered simply as capillary stasis. It is remarkable, in both cases, that the pulse was noted lowest on the eleventh day, when it was at 56 in Madden and at 52 in Slaney, after which it began to rise in both cases. The symptoms of gastro-hepatic disturbance were renewed in Slaney after the skin affection had disappeared, but these symptoms gave way to an emetic, and a deobstruent laxative.

No other case through the epidemic afforded a better example of the nature and course of the eruption than Slaney's did; although, in later cases, petechiæ and vibices were noted in the legs as effects of the capillary stasis, and in some desquamation was seen to occur on the palms and soles, yet, taken as a whole, I cannot recall any instance affording more typical characters of a severe attack of denguè.

It would not, I think, be advantageous to multiply illustrative cases, but it may be so to sketch out the collected symptomatology of the disease.

Incubative stage.—This was uncertain; in many cases there was indisposition of a few days' duration previous to rigor or chills, frequently attended by disorder of the chylopoietics, but in quite as many instances the attack was sudden and at once violent.

Invasion.—This was rarely attended with rigors in any but very sudden attacks. Previous to the pyretic stage there were usually chills and creeping sensations through the

limbs and back, preceding prostration with a sense of danger, sometimes amounting to apathy. In two children, aged about ten years, I saw epileptiform convulsions usher in the fever.

Heat stage. — Attended by intense frontal and orbital headache, as if the eyes were being forced from the orbits, severe pains in the spine and limbs, restlessness; secretions in general inactive, eyes reddened and dry; face, neck, and trunk flushed as if scarlatinous, sometimes rubeoloid; temperature much raised, external sensibility diminished. Pulse always excited in frequency, usually labouring in force; tongue unaffected in cases of sudden seizure, but coated, often yellow-pasted, where there had been premonitory indisposition.

This stage was of irregular duration from 6 to 36 hours without abatement, until it remitted *by perspiration in a drowsy sleep.* Perhaps in the majority of persons attacked, milder febrile reactions with remissions continued to appear for a couple of days subsequently to the *sweating crisis*, during which the headache first disappeared, then the spinal pains, and lastly those of the limbs. About the fourth day the patient began to convalesce; free spontaneous evacuations of the bowels, and restored kidney secretion, marking substantial improvement. After a few days of induced debility the patient felt again in his ordinary health.

The eruption in this form was usually bright red, with raised papillæ of skin, the redness disappearing under the fingers and returning on removal of pressure. In the mild cases above referred to, it took on a duskier hue, fading under the fingers, and disappearing during convalescence. Sudamina about the neck and trunk often appeared in the sweating crisis. It was evident throughout the epidemic that, with a vivid rash in the first stage, there was protection from second attacks.

The fallen pulse, increasing its frequency on rising from the recumbent to the erect position, on which change syncope occurred at times, was a constant phenomenon, although less strongly marked and of shorter continuance in some cases than in others.

In the severer form of the fever, of which Slaney's case may be taken as an example, the irregular fever reactions of the stage of subsidence existed until the seventh day, when a well marked metaptosis occurred, followed by the series of symptoms which distinguish this epidemic disease.

Previous to that change, in the severest form, the phe-

nomena already described were more marked. While the eruption on the face was continuous like scarlatina, that on the chest was patchy like rubeola. Disorder of the liver and mucous digestive track was indicated by the yellow-coated, red-edged tongue, and by diarrhœa with general soreness of the abdomen. Hæmorrhagic effort towards external surface was displayed in epistaxis, and turgescence of the mouth lining.

After the seventh day change the eruption became universally rubeoloid over the body and limbs. There was no fever heat; hæmorrhagic tendency quickly disappeared; the circulation increased in strength through several days; the headache went off at once, but the dorsal and limb pains lingered.

This was but a prolonged stage of subsidence of the disease. During it the tongue did not cast off its saburral coat, showing that the gastro-hepatic functions were morbidly performed, and, as in several instances this loaded state of the tongue returned after partial cleansing in the sweating stage, it was inferred that depraved secretions from the stomach and its collateral viscera, were the result of that congestive stasis of blood in them of which there were so many simultaneous indications externally.

Other secreting organs besides the liver were liable to engorgement. More rarely the respiratory mucous track displayed symptoms of passive congestion; slight hæmoptysis resulted in one case. The more prominent phenomena were:—

I. That peculiar depression of nervous force that pervaded the epidemic cases as one of the first and chief symptoms, a sense of prostration which sometimes became more distressing than actual pains, and frequently blunted the perceptive and reflective faculties, of which the cause appeared to influence the public health beyond producing this epidemic fever. The sick of all diseases were depressed and slow to convalesce. Men of intemperate habits were liable to more than usual depression, with increased liability to irritation of the central nervous organs; thus the number of cases of delirium tremens treated, and the ratio of deaths by it in the summer of 1860, were unusually large, and there was no other way of accounting for this than by assuming that some extraordinary depressing agency modified all nervous affections.

II. Attendant on this state of nervous force were pains in the head, back, and limbs, most severe in the lower ex-

tremities. Of these, headache was the first in invasion and first to disappear after the sweating. It was frontal and orbital, often described as pushing, or tearing the deeply injected eyeballs from the sockets. The patient disliked raising his head from the pillow, but the admission of bright light did not seem to increase his sufferings. The occipital pain was of a dull throbbing nature. The special senses of sight, hearing, smell and taste, were generally obtuse, without being perverted. The mental faculties were dull in the stage of excitement, and enfeebled in that of subsidence, but no case of delirium or of amentia was noted in my practice. Spinal pains between the scapulæ and in the loins, coexisted with the headache, gradually increased with the stage of excitement, remained unalleviated through the sweating stage, produciug dread of disturbance from the assumed posture, which was generally on the right side, with the chin depressed, and the legs drawn up. In the severe cases the pains in the back declined slowly after the stadium-point of the fever, and the decline was rarely interrupted or checked. The pains in the central nervous organs were most probably dependent on the impression of the morbific cause on nerve tissue, subsequently prolonged by capillary hæmastasis. The epigastric and hypochondriac pains were probably referable to the semilunar ganglia, deriving imperfect innervation from the central nervous system. The rheumatic pains, as they are styled, are most marked in the lower extremities. Dr. Copland has accepted the opinion of Dr. Dickson of Charleston, that this symptom is caused by similar changes in the synovial and other deep tissues to those observed in the vascular rete of the skin. These may be efficient causes, attributable, previous to the metaptosis, to active capillary congestion, and subsequent to that, to passive capillary congestion in the localities in which the pains are felt; and inasmuch as they are not attended by effusion of serum or lymph into the tissues affected, as in rheumatism or in common phlogosis, I attribute them rather to defective innervation dependent on capillary stasis in the nervous organs, and I conclude that the pains in the limbs are not rheumatic but neuralgic in their character.

III. Ulcerative stomatitis, affecting the check lining, the gums, and the faucial pillars, with darkly injected glazed surface, and, in some instances, with breach of soft tissue at the margin of the gums, from which slight hæmorrhages occurred. The condition resembled that of mercurial sali-

vation but without fœtor, unless when mercurials had been given. In the earliest instances it was assumed to be that result, although not clearly traced to it, as only a small quantity of mild mercurial alteratives had been administered. This led to the omission of the remedy, after which, as other cases of milder degree occurred, the true relation of the symptom to the febrile disorder of the system was recognised. A vascular condition of the gums and lining membrane of mouth was the ordinary state; and whenever mercurials were given, ulcerative action was so frequently produced as to contraindicate their use, even as a purgative, after which nothing beyond vascular injection with increased salivary secretion was observed, so thus the ulceration must be assigned to the drug, and the symptom of disease limited to capillary congestion. Tonsillar abscess did not form in any instance. "Herpes labialis" may be alluded to as occurring frequently in the sweating stage preceding the stadium. It suggests a miasmatous origin of this disorder, as it is a common attendant on the sweating stage of periodic fevers in hot climates. Epistaxis was the only hæmorrhage that occurred. No instance of hæmatemesis or of melæna was seen. This symptom and those of stomatitis commenced in the stage of active congestion, preceding the stadium of the disease, subsequent to which hæmorrhagic tendency towards the mucous surfaces declined rapidly. In this a difference between this febrile disorder and yellow-fever is displayed, because, in yellow-fever, as a rule, hæmorrhages from mucous membranes occur after the metaptosis, and not before.

The urine did not offer anything remarkably different from what is seen in the ordinary febrile affections. In the stage of heat it was scanty and highly charged. In the sweating stage it was more copious, and presented traces of albumen in a few instances. In the stage of subsidence it was voided of pale colour in more than normal quantity.

Nothing positive can be stated on pathological changes in a disease in which death is unknown, except from untoward complications. No example of inflammatory action in any organ occurred in my practice, nor any case of a direct sequela, as in exanthems. But of the patients of 1860, one died in this hospital in 1863 of kidney disease, with consequent inflammation of both surfaces of the heart. During the attack of "dengue," which was a mild one, no renal symptoms were noted, but it is not impossible that he had albuminuria unnoticed.

I heard in 1860 of a case of temporary amentia after an attack of denguè, and of a case in which death within a moderate period happened from brain disease in a person predisposed hereditarily. Denguè has no regular sequelæ, which fact diagnoses it from rheumatism and from the proper eruptive fevers. The liver is the secreting organ whose functions are most disordered, but not amounting to inflammation in any instance within my knowledge.

INFECTIOUS OR CONTAGIOUS PROPERTIES.

On this important sanitary question the authorities already quoted are at variance. Dr. Copland, guided by the opinions of writers of the British school, who had seen this disease in the East or West Indies, asserts that "the disease is not only epidemic but decidedly infectious."

Dr. Wood of the American school states, "No other cause of this affection is known than epidemic influence. It has been ascribed to contagion, but the proofs are insufficient. Contagious affections do not so rapidly disappear without leaving traces behind them. Besides, it is stated, that when families are attacked, it is not a single member of the family that is first affected, and afterwards, at a certain period, several others; but almost all are seized at once, or in rapid succession, so that there are not enough well to attend on the sick. The great majority of the people usually suffer. The epidemic which in this respect most nearly resembles it is influenza."

My experience of two epidemics is this. In the epidemic of 1860, three out of four medical officers were attacked, but none of the nurses, constantly in the hospital wards, appears on the sick returns. In 1863, the medical officers suffered again, and three white nurses—Europeans, new men at hospital duty—were attacked, but the proportion among the entire number of hospital attendants did not exceed that in the general population.

In the epidemic of 1860, the neighbours on either side of my residence, separated from it merely by party walls, suffered largely. In my house two coloured servants only were ill of it. In 1863, I was ill among the earliest of the epidemic cases, but none else was attacked in my own or the adjacent house. On both occasions I was of opinion that no extension of the disease occurred among the ordinary patients, although segregation of the fever patients was not observed.

RELATION TO YELLOW-FEVER.

There is a question connected with this disease as an ally of yellow-fever. Mr. Kennedy, a former deputy-inspector of this hospital, in reporting on the yellow-fever of 1837, remarked, "There has also been another fever very general all over these islands for the last month" (the height of the epidemic). "It is known by the name of dandy or broken-bone fever. These cases have all been mild, and generally yielded to treatment on the third day."

Now this asserts a coexistence of the two forms of fever, with regard to which Dr. Wood also, after describing the symptoms of denguè, states, "The course of symptoms above detailed, bears a considerable resemblance to that of yellow-fever, and the two affections have sometimes been confounded. It is not improbable that the causes of the two affections may sometimes prevail at the same time, in which case the yellow-fever may take on some of the characters of this peculiar epidemic, and the diagnosis be rendered more difficult.

Opinions like these leave it an open question, whether there be not some affinity between the essential causes of two forms of fever, thus blended in one epidemic. On both occasions of epidemic outburst observed by myself, there has been a popular belief "that the yellow-fever had broken out," which belief has not been shaken until the harmlessness of results had convinced that the fever could be no other than the denguè. Until it be ascertained that the diseases are of the same nature, it may even be assumed that by diagnostic acumen, such as Mr. Kennedy displayed in 1837, there would be always a large percentage of denguè eliminated from yellow-fever returns, sufficient to account for the great difference in the epidemics, as well as the disparity of the ratio of deaths given by different practitioners, and, if these two very analogous forms of disease are distinct, in the same epidemic, it is even possible that the numerous instances of double attacks may be justly received as distinct invasions of the two diseases—the first of denguè and the second of yellow-fever. Certainly, the accession of a severe case of denguè is so much like that of yellow-fever, as to render the diagnosis difficult, and this similarity continues until the metaptosis occurs, which, in both diseases, is followed by capillary stasis of blood, towards the dermal surface in denguè, and the gastric surface in yellow-fever, with

a remarkably slow pulse; this metaptosis being the true point of divergence for diagnostic purposes in these fever epidemics. Whether a specific cause, differing only in force, does originate phenomena so nearly allied to each other, we have not, as yet, accurate means of deciding. The remarkable instances of coexistence at Bermuda, and that of the United States ship of war *Hornet*, appear, as far as they go, suggestive of that conclusion. A detailed account of the facts of that outbreak of yellow-fever, while surrounded by an epidemic of dengue, will be found in the *American Journal of Medical Sciences*, vol. xii, pp. 307-8, communicated by Dr. Barrington of the United States navy, surgeon of the ship.

Treatment.—No special treatment is needful in a disease in which a fatal result is not to be apprehended. The ordinary treatment used in mild febrile attacks is efficacious—watching and administering for the relief of symptoms that may rise into greater importance, adhering to simple remedies, not being hurried into depletory measures on account of the severe pains, etc., of the heat stage.

Emetics were found generally beneficial, when administered very early, as the retching would then cease before the accession of turgescence of the mucous surfaces, and benefit was derived from the early emptying of the gall-bladder; when given after the hot stage had fairly set in, their action was prolonged into painful nausea and retching, which rendered the headache more severe, and kept up the erethism of the system without hastening the sweating crisis.

Purgatives were often useful where systematic disturbance with diarrhœa had not been preliminary of the chills, as black draught, or half an ounce of castor-oil with a little tincture of rhubarb; but if tormina or uneasiness oppressed, Gregory's powder was preferable. On the fourth day a laxative dose, to remove the sordes accumulated in the canal in the stage of checked watery secretion, was often required; its action generally caused a rebound of the constitutional powers, and thus the stadium of the fever was the more quickly passed.

Salines were always given in the hot and sweating stages. With the scarlatinous eruption the common antimonial saline mixture was the best form, when irritability of stomach did not prohibit the use of antimony, and then effervescent alkaline draughts were substituted, with five drops of laudanum in each draught, four times a day where diarrhœal

tendency existed. In the rubeoloid form of rash, as the nervous force was generally lower, and the stomach more frequently irritable than in the scarlatinous, the mist. liq. ammon. acet., with excess of the volatile alkali, and nitric ether added, was found a most useful medicine. Both forms were beneficial in keeping open the skin emunctories, and in regulating the vascular excitability. When the hot stage was slow to pass into the sweating stage, or the latter was broken by periods of dry heat, James's powder was given. The state of the lining of the mouth often required correction at an early period. Gargles of alum or chloruret of soda with myrrh, were commonly used for that purpose. As soon as the stadium was passed, if there was no disorder of the bowels, vegetable tonics were given; at first, quinine was considered to be the most appropriate remedy, but later, ordinary bitter infusions, with nitro-muriatic acid and tincture of orange-peel were found equally efficacious in all but special cases. It happened repeatedly that the stadium was followed by a renewal of the gastro-hepatic disturbance—anorexia, eructations, nausea, hypochondrial uneasiness, and a thickly loaded white tongue indicating the disorder which retarded convalescence. In such cases the use of an emetic in the morning, repeated on a subsequent day if necessary, rarely failed to correct the disorder of the primæ viæ.

External remedies.—The warm bath was not much used in the treatment of the early stages, as the patient arrived, for the most part, in a state of perspiration: but when not so, and again later, after the stadium, warm baths were of great service, especially when lividity remained after the rubeoloid rash.

Cold epithems to the brows and vertex were generally asked for by the patients from the invasion to the stadium, but not after that had been passed.

Foments by flannel stupes over the abdomen rarely failed to relieve dragging sensations at the hypochondria or the epigastrium, general soreness of the muscular walls, and tenderness to touch in the lower belly.

Sinapisms afforded relief to nausea and retching, and to the feeling of weight and heaviness at the sternum, which sometimes oppressed the breathing.

Depletory measures were not employed in any instance.

Mercurials in any form, even as purgatives, were abstained from at an early period of the epidemic. At first alterative doses of pil. hydrarg., or of the pulv. hydrarg. creta., combined with pulv. ipecac. co. were given, together with saline

diaphoretic draughts, but from the symptomatic turgescence of the gums, which was aggravated by the use of mercury, ptyalism resulted rapidly when that mineral was given. This untoward complication led to an entire abandonment of mercurials; subsequent to which a decreasing average duration of treatment in hospital led to the inference that something had been gained by their omission.

ON THE OUTBREAK OF EPIDEMIC CEREBRO-SPINAL MENINGITIS IN THE PROVINCE OF DANTZIC IN 1865.

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FROM the very scanty and defective accounts of the first outbreak of epidemic meningitis in the province of Dantzic, accounts that appear to be the less trustworthy, since the attention of the physicians and of the authorities was first called to the epidemic at a later period, it is altogether impossible to determine where and when the pestilence had its origin. From the results of many inquiries, and from inspection of the bills of mortality, I am of opinion that the disease had not occurred as an epidemic, in the West Prussian districts, before the beginning of this year; while some information received during my journey through the southern part of the circle of Berent, and the accordant testimony of the district physician, Dr. Wolff, of Conitz, (and also of the Government physician, Dr. Pian, in his report to the Government of Dantzic, under date of the 21st of March, 1865,) place it beyond doubt that epidemic meningitis had prevailed, in the parts of Marienverder adjacent to the province of Dantzic, during the latter part of last year, and had been attended by a considerable mortality. The results of my own observations show that the disease had prevailed, in a malignant form, in December 1864, at Long, in the district of Czersker. Dr. Wolff observed that, at the same time, six cases occurred in the German village of Czekzeyn, belonging to the district of Osterwyck; and that four of these terminated fatally in from twenty-four to twenty-eight hours. The priest of the Catholic parish of Wielle declares, in his report of March 21st, 1865, to the local council of Berent, that at the end of last and the beginning of the present year, in the Conitz portions of his parish, numerous cases of meningitis

had occurred, both in children and adults; and that about eighty of the persons affected, mostly children, had died. Whether from this focus the disease extended itself in a northerly direction, and thus penetrated the province of Dantzic, cannot be determined; and the assumption of such a gradual and continual progress of the pestilence cannot be based on anything more than high probability, since it appeared simultaneously at the most various and distant points of the 150 square miles comprised in the province; and, also, in its eventual extension over the whole region, showed nothing less than a linear or radiating course, and rather gained ground by leaps. Many places, lying between others previously attacked, were for a long time exempt, and suffered at a much later period. In a word, the disease never had the character of proceeding gradually from one point to another, or to several points, as we are accustomed to observe in cholera. The evidence of this is furnished to us by the bills of mortality extracted from church registers, from which we may observe that the first deaths, in the different parts of the province attacked by the pestilence, happened nearly at the same time. We may venture to draw from this some conclusions with regard to the date of the outbreak, since the malady was rapidly fatal at the commencement of the epidemic; and, therefore, the first deaths would accurately coincide, in point of time, with the first cases. To cite a few examples, we find the first deaths from meningitis in Great Klinsoh and Kornen (in the western part of the circle of Berent) on the 7th and 9th of January; in Upper Malkan (in the southern part of the circle), on the 15th of January; in Borsestavo (in the northern part of Carthaus), on the 10th of January; in Pasewark, Stetthof, and other places in the Dantzic territory, about the middle of January, and so on. We pass over that the disease, in a space of about eight days, appeared suddenly in the most remote parts of the province; and we see, on the other hand, from the following facts, in the most impressive manner, how, by the side of the almost simultaneous outbreak of the epidemic in the different localities of so large a province, the further extension was not the less continuous, although occasionally interrupted. In the large village of Chmelno, in the north of the circle of Carthaus, the first death from meningitis occurred on the 17th of February; while at Czesience, a quarter of a mile distant, on the Dantzic and Stolpe high road, the first death had occurred on the 6th of February; at Saworg, on the opposite bank of the small lake of Klodno, the disease first ap-

peared in the middle of March; while at Sohmentan, a quarter of a mile from Saworg, and so much further distant from Chmelno, it was fatal by the middle of February. In the village of Gorrenczyn, in the centre of the circle of Carthaus, the first death is recorded on the 25th of February, and in Ostritz, a quarter of a mile distant, as early as on the 15th of January; but at Semlin, about the same distance to the east of Gorrenczyn, not until the 9th of February. At the village of Schulzen, in the southern part of Carthaus, the first death from meningitis occurred on the 22nd of January; while at Nakel, scarcely a quarter of a mile distant, the first was on the 9th of March, In Upper Malkan (to the south of the circle of Berent), the first death occurred on the 12th of January; while in the following villages, only a little distant from Upper Malkan, and from each other, deaths occurred as follows:—at Pallubinnen on the 26th of February, at Boschpohl on the 2nd of March, at Schloss Kischan on the 12th of February, at Old Kischan on the 22nd of February, and at Chwarzenko on the 21st of January. At the town of Schöneck, in the circle of Berent, the first fatal case occurred on the 21st of January; while the first at Demlin, about a quarter of a mile distant, and lying by the side of the high road, was on the 28th of February. At Bodenwinkel, Stutthof, Steegen, and Steegener Werder, places a little way apart in the vicinity of Dantzic, the first deaths took place on the 26th of February, the 20th of January, the 21st of February, and the 15th of March. These data are sufficient to exhibit the above-described mode of development of the disease.

The spreading of the disease over the whole province, so far as this had occurred at the close of my observations (end of March and beginning of April), presented very considerable differences in different circles, and in different localities within the same circle. The disease had by far the largest, or an almost general, diffusion over the circles of Berent and Carthaus, was of very limited prevalence in the circle of Stargardt, was considerable in Dantzic, both town and circle; was observed only in isolated localities, and soon passed away, in the circles of Marienburg and Elbing; and only in isolated cases in the circle of Neustadt.

In *Berent*, by the end of March, the disease had extended itself over nearly the whole of the circle: at least the south-eastern parts, bordering the circle of Stargardt, had been visited. From the 7th of January, on which day the first recorded death occurred in the Berent circle, to the 22nd of

March, so far as I could ascertain, 381 persons died from the disease. This mortality was spread over 122 places, with a population amounting to 28,522 souls; so that 1·44 per cent. of the inhabitants died of meningitis. It must be remarked that, of these 381 deaths, 359 were persons not over fifteen years of age; and, if we assume that persons under fifteen amounted to 33⅓ per cent. of the population, we have for this period of life a mortality of 4·32 per cent. It will assist in the estimation of this enormous mortality to observe that, in 1862 and 1863, the total mortality of children under fifteen, in the entire circle, amounted to 344 and 426 respectively; so that the number of children dying from meningitis in about two months, in localities covering about two-thirds of the circle, is nearly equal to the average annual mortality of the same class, from all causes, for the whole of the circle. If we next inquire into the proportion of mortality in different places, we find that in some large communities only one or few cases have been fatal; while in others, and chiefly among children, the enormous mortality of from 10 to 14 per cent. has been attained; as in Kornen 9·2 per cent. in Lipsohin 10·4 per cent. in Great Klinsoh and Lippusch 12 per cent., in Wenglikavitz 14 per cent.

In the circle of *Carthaus* the epidemic obtained an almost equally general, but more gradual prevalence. The northern and north-eastern parts of the circle, bordering the circles of Neustadt and Dantzic, remained almost entirely free from disease up to the time (the middle of April) at which my inquiries terminated; while it had prevailed generally in other parts of the circle. From the 10th of January, on which day the first recorded death from meningitis in the circle occurred at Borsestavo, to the 24th of April, up to which my tables of mortality are carried, 398 persons died in 127 localities, and in a population of 25,075; or a total mortality of 1·58 per cent. Of the 398 persons, 378 were under fifteen; and if we assume, as above, the whole population under fifteen to be 8,360, we have for them a mortality of 4·52 per cent. In this circle, also, the mortality was very unequally distributed among the affected localities. In some places only one or two deaths occurred, and in others the mortality, among children, rose from 8 to 17 per cent. For example, in Schülzen it became 7·7, in Sullenczyn and Stendsitz 10, in Wensiory and Stockhutte 11, in Pollenczyn 13, and in Borsestavo 17 per cent.

As already remarked, up to the day to which my advices

reach, the northern parts of the circle had suffered little; and the same observation applies, in a higher degree, to the immediately adjacent circle of Neustadt, where, as far as I can learn, only a few scattered cases of cerebro-spinal meningitis have been observed. Whether this comparative immunity continues, I have not discovered.

Upon the prevalence of the epidemic in the circle of Stargardt, I possess only scanty information; but sufficient to show that it was inconsiderable. Scattered cases occurred in the town of Stargardt itself, and in several localities bordering upon Berent; among others at Studzienitz, where, between the 18th of January and the 4th of April, three fatal cases occurred among the Catholic population in children of from one to seven years old.

In the town and circle of Dantzic, the prevalence of the epidemic was more considerable. In this territory I found four foci of pestilence, of which one was in immediate connection with the before-named, while the other three were completely isolated. The first named, small, was in the south-western part of the circle, near the border of the circle of Carthaus (in Meisterswalde, Braunsdorf, Sackoczyn, and other places), where, within the first four months of this year, a number of deaths happened from epidemic meningitis. A second focus of disease was in the town of Dantzic and its immediate vicinity. Here, as early as the beginning of January, especially in the garrison, a few cases occurred; and in the middle of March the epidemic spread itself over the whole town; and, although neither then nor later, as far as I know, covering any large surface, it yet destroyed no small number of victims; of whom, from the want of statistical materials, I can give no exact account. A third isolated focus was in the north-western part of the Dantzic island, especially in the communities of Zunder, Korsemark, Schmeerblock, and Schönrohr; while in other places, as in the villages of Kriefkohl and Muhlberg, only scattered cases of the disease were observed. A fourth focus of disease in this circle was on the delta of the Vistula known as the Dantzic peninsula, where the first fatal case occurred at the end of January, at Stutthof, in the eastern part of the district; and the disease then travelled from east to west, not continuously or regularly, but in a way very worthy of remark, and by March had reached the parish of Schönbrunn, in the south-west of the district, and especially the communities of Letsohkomov, Weide, and Schönbrunn. To the west of Pasewark, and to the north-east of Schönbrunn, so far as I

could ascertain, no fatal case had occurred up to the 1st of April.

With this outbreak the small epidemic in the circles of Marienburg and Elbing was manifestly locally connected. Simultaneously with the first outbreak in the Dantzic peninsula there were scattered cases in some villages of Marienburg, on the south bank of the Elbing Vistula, opposite to the places in the peninsula suffering from pestilence. This occurred at Hinterthor and Tiegenort; and a little later, in the middle of February, the disease established itself in the circle of Elbing, at a short distance from the above places, in the villages of Jungfer and Keitelau, lying on the shore at the outlet of the Jungfer lake; while single cases occurred also in other bank side communities, as at Zeyers. In Keitelau, a small village of only 175 poor inhabitants, only five cases occurred, in girls of from 5 to 17 years of age, three of whom died. In the very prosperous village of Jungfer, with 1000 inhabitants, the disease appeared on the 14th of February and ceased on the 13th of March. Within this period 24 persons were attacked, and 16 of them died, but I could only obtain a nominal list of 19 cases and 12 deaths. In other parts of the circles of Marienburg and Elbing the disease, as far as I can learn, has not appeared as an epidemic.

With regard to an opinion upon the extent of the epidemic, and the number of persons attacked in the several affected localities of the province, I have only been able to use the proportion of mortality, since, for the under-mentioned reasons, the proportion of disease, except in a few cases, remains unknown. It may be determined approximatively from the mortality, if we assume, what is certainly not too high, that this amounted to 30 per cent. of the patients, the slight cases not being included; so that, in the infected localities of the circles of Berent and Carthaus, there were attacked in each about 1,900 persons, or in Berent about seven per cent., and in Carthaus about 7·6 per cent. of the entire number of the population.

With regard to the duration and extent of the epidemic great differences were observable in the different localities in which it prevailed; differences sometimes depending upon density of population, and sometimes upon other causes not ascertained. We find:

1. A series of places in which the disease rapidly occasioned one or more deaths, and then, as a cause of mortality, disappeared.

II. Places where the epidemic, in a course of three or four weeks, spread over the whole locality, occasioned considerable mortality, and then wholly ceased.

III. Many places in which the disease lingered for many weeks, in each destroying a few persons, and thus causing a very gradually increasing mortality. This course appears to have been the rule.

It will be impossible to obtain a complete insight into these proportions until the medical or local authorities are enabled to exercise, in this disease, as well as in epidemics generally, a control, not only over the records of death, but also over all occurring cases. They would then be able to supply statistical returns.

It has been remarked by several observers of our epidemic, that it, like most infectious disorders, ran a more rapid and malignant course at the beginning of an outbreak than afterwards; that the cases of *fourdroyante* meningitis occurred chiefly at the beginning; and that subsequently the disease was not only of less rapid course, but of less malignity. When I came to Dantzic in the middle of March, I had opportunities, as previously in Berent, of observing a series of cases that terminated fatally in from 24 to 36 hours; while Dr. Saunderson, who was sent to Dantzic by the British Government, in order to observe the disease, and who arrived there in the middle of April, informed me that he had not seen one single instance of the kind. The same conclusion would be drawn from the bills of mortality of several affected places, since the number of deaths at the beginning of an outbreak is not only greater, but also more crowded together, than at a later period of its course.

I have paid considerable attention to the question of the prevalence of other infectious diseases simultaneously with the epidemic meningitis, and have arrived at the conclusion that the latter has generally had the field to itself. I have observed, for instance, that malarious fever has been absent during the prevalence of epidemic meningitis, or has only occurred in isolated cases; and that not only in high places, unfavourable to its development, but also in the low lands where it is endemic. Typhus fever, moreover, did not occur as an epidemic, excepting to a small extent in some localities, in the circle of Carthaus (as in Nakel, Schulzen, and Porchan) where it had existed all the winter; and in Berent, at Old-Kischan, where I found seven cases of typhus in one room of a miserable hovel. Measles and scarlet fever were not frequent in any of the places visited by the epidemic,

and certainly were not epidemic themselves, either before or together with the meningitis; but in some of the low lands that escaped the latter there was an inconsiderable prevalence of hooping cough. Bronchial catarrh and croup were observed with unusual frequency in many of the localities that I visited; but, on the other hand, I was assured by many physicians, of whom I made special inquiries, that there was a remarkable absence of pneumonia and of other inflammatory affections during the prevalence of epidemic meningitis.

DESCRIPTION OF THE DISEASE.

In most cases the outbreak of the disease is preceded by a premonitory stage, which is commonly of very short duration, lasting but a few hours, or rarely a few days, and usually characterised by symptoms that denote the centre of localisation of the developed malady, so that the first phenomena seem naturally to precede the eventual morbid processes.

To such symptoms belong (disregarding general feelings of indisposition and slight febrile disturbances that, in prolongation of the premonitory stage, may recur frequently, or may be altogether absent) a more or less acute head-ache, not seldom attended by pains and stiffness of the neck, or even of the back and upper extremities; and next enteralgia or cardialgia, sometimes described by children as pain in the bowels. This symptom was in some places so prominent, that the parents or survivors, in cases where it had ushered in a fatal attack, had entered "belly ache" in the church books as the cause of death. Nausea and vomiting also occurred, especially when the disease first appeared soon after a meal. Many patients in this stage of the disease assumed a pallid and cadaverous appearance, but in some there was redness of the face, and the patients, especially children, cowered close to the stove. If the attack commenced in the evening or night the patients were usually sleepless, or had only very disturbed and restless sleep. It is to be remarked as especially characteristic that, already in this stage, when it is prolonged over several days, the symptoms, especially when general fever is present, present a rhythmical character, like that of an intermittent malady. Severe symptoms, such as transient delirium or somnolence, may occur, in daily recurring paroxysms, at a determinate hour, sometimes followed by a general sweating. Such occurrences, especially at the beginning of the epidemic, led

many physicians to believe that they had to deal with a malarious fever.

It is difficult to decide what proportion the number of cases having a preliminary stage bore to those in which it was wanting. The duration of the premonitory stage was often very short, only two or three hours, and it was often so slight as to be noticed neither by the patients themselves (especially children) nor by those around them. In forty cases, in which I made careful inquiry into this part of the history, there was a distinct premonitory stage in twenty-four. In the other sixteen it was either wanting, or so slight as to escape notice; I believe, however, that there can be no doubt that the disease has often commenced suddenly, and in most of these cases by a rigor, immediately after which all its characteristic phenomena were completely developed. Some individuals who had been quite well at supper-time and bed-time, have, either during the night or very early in the morning, awoke with severe illness; and of children, who formed the majority of the patients, some have gone away to school in seeming health, and have been brought home in consequence of a sudden attack. Lastly, of which I saw several examples, persons were stricken down in the middle of their daily work, or when walking by the way. Whether the disease commenced at one hour of the day more frequently than at another I cannot decide; in twenty-five cases in which I noted the hour of the first out-break of characteristic symptoms, they occurred five times in the course of the forenoon, six times about noon, six times in the afternoon, and eight times at evening or night.

In by far the greater number of cases the disease commenced by more or less marked shivering, and often by a complete cold stage that sometimes continued for an hour or an hour and a half, and was followed by heat, which, however, bore no proportion to the severity of the preceding shivering, and did not, in general, reach to any considerable degree. In some cases, also, the hot stage was so transient that neither the patient nor the bystanders perceived it; so that the disease, apart from the rarely absent shivering, appeared to be ushered in without fever, and not seldom also to run its subsequent course without fever. In other, but less common cases, the shivering was slight, so that the disease appeared to begin with heat; and, in a third series, the shivering was followed by a definite hot stage, that then underwent remissions and exacerbations

during the whole progress of the case. Lastly, the attacks of cold and heat may recur often during the progress of the case, attended by an increase of the general symptoms, and in so definite a rhythm that the whole illness presents much of the character of a malarious fever — a resemblance to which I have already referred when treating of the premonitory stage, and to which I shall specially return in the sequel.

These variations correspond with many differences of the pulse, as well as of the temperature and colour of the skin and mucous membranes, both in any single case and in different cases when compared; the pulse scarcely ever shews, either at the beginning or in a later stage of the disease, the peculiar characteristics of the so-called inflammatory diseases; and in only one of the numerous records of cases lying before me do I find mention of a large hard full pulse. It was commonly more or less quickened, sometimes very much retarded at the beginning and quickened at a later period, mostly small; and, in the presence of marked symptoms of depression, often thready or vanishing, sometimes rhythmical. As in most of the other symptoms, so also in the pulse, remarkable variations took place; so that I found it now quickened and small, and a few hours later slower and fuller, or even irregular, arhythmic, or interrupted. Moreover the quickening of the pulse has appeared to me to be far more frequently the result of a disturbance of the innervation of the heart, produced by depression or irritation, than of any feverish condition; since, with a pulse more or less quickened I have often found the temperature normal, or even depressed. For evidence and farther illustration of this position I subjoin the following cases:—

I. In a boy 8 years old, in whom a very acute meningitis, terminating fatally in three days, was ushered in by strong shivering, I found the pulse on the first day, and during the whole course of the disease, small, and never exceeding 24 beats in the quarter of a minute.

II. In a boy 4 years old, who also died in three days, I found the pulse on the second day, with sunken temperature, very small, irregular, and slow. On the third day, about twelve hours before death, it was small, but regular, and very rapid.

III. In a soldier 21 years old, in whom from the first symptoms of great depression were manifest, the pulse fell at the beginning to 76 beats, later to 64, or even 60, and first rose when the patient awoke from somnolence.

IV. In a strong girl of 15, severely attacked, the pulse on the first day was somewhat hard and full, with a frequency of 84. On the next day, with some elevation of temperature, the pulse rose to 120; during the rest of the illness, with somewhat elevated temperature, the pulse ranged ordinarily from 88 to 96, and only varied to 108.

V. In a girl 2 years old, in whom the disease lasted several weeks, but never attained any great degree of intensity, the pulse was throughout quickened (100 to 120) but always small.

VI. In a strong man of 40, at the beginning of a very severe attack, and during the first fourteen days, the pulse showed no quickening; and only afterwards, with great depression of the strength, rose to 96.

VII. In a slight case in a girl of 18, that proceeded quickly to convalescence, I found on the second day a small remarkably slow pulse of 60 beats.

The temperature of the skin was seldom much increased; but there was generally some increase of heat, as one among indications of congestion of the head, and most perceptible on the head, and on the frequently flushed face. A small series of exact observations, taken in the axillæ, showed that the heat of the body, even in cases attended by feverishness, was little elevated above the normal, and never attained the height common in malarious or typhus fever. In a strong girl of 15, at the height of an acute attack, the temperature varied from 30·6° to 30·9°. In three other cases in adult males (soldiers) where the disease assumed an intermittent type, and the temperature at the beginning was for a short time raised to 31° or 32°, it soon fell to the normal standard, and was but little increased during the exacerbations. In the cases with small rapid pulse, the covered parts of the body did not feel unusually warm to the hand; and more often the skin even appeared cool, as also in a case where the pulse was slow and the patient complained of great inward heat. In another case, well developed, in a man of 21, at the height of the disease, the pulse being from 64 to 66, the temperature in the axilla was as low as from 29·6° to 28·2°. A bright colouring and turgescence of the skin I have only seen in very few cases; and then only in the face, under the conditions already mentioned. The patients are almost always pallid and sunken, and in many cases show from the first the picture of a deep collapse.

Among the most constant and persistent symptoms of the

disease the first place must be given to headache, the character and seat of which display many differences, but which is always described by the patient to be extremely acute and insupportable. Headache is, as before mentioned, one of the first and most constant symptoms of the premonitory stage, and its acute increase shows, in such cases, the actual outbreak of the developed disease. Very frequently the pain is referred to the occiput, sometimes to the brows, and the patient often declares that the whole of the head suffers. This symptom commonly continues during the whole progress of the case, and often declares itself even in states of somnolence, by expressions of pain, or by pressure of the hands upon the head. In cases that terminate favourably the headache sometimes continues far into the period of convalescence, as in the case of a girl of 13, who, in the fifth week of her illness, being then almost recovered, although thin and feeble, still complained of a headache that even underwent periodical exacerbations. Not unfrequently there is associated with the headache a painful dragging or tension in the neck, which sometimes is continued farther downwards to the back, and which often ushers in subsequent tetanic rigidity of the cervical and dorsal regions. This condition sometimes continues during the whole course of the disease; and even, as I have twice had opportunities of observing, encroaches upon the period of reconvalescence, so that every active or passive movement of the head is attended by pain. Another symptom sometimes manifested at the beginning of the disease, together with the headache, but only seldom observed by myself, is a feeling of giddiness, such that the patient can neither remain erect upon his feet, nor sit up in bed. This was strikingly manifest in a case reported to me on medical authority, in which the patient, suddenly attacked with furious delirium, reeled about the room like a drunken man.

Less constant and persistent than the headache, but present in most cases of a certain degree of development, was delirium, alternating with somnolence, and, in a later stage of the disease, not infrequently passing into sopor, or even coma. Delirium, together with headache, was often among the first symptoms, and continued, alternating with somnolence, during the whole course of the disease. The delirium was in some cases furious, so that the patient was in the greatest agitation and could only with difficulty be controlled; and this state was usually soon followed by sopor or coma. In very acute cases there was no delirium, the

patient being soporose from the first, and dying in this condition without ever being aroused. In the case of a boy 8 years old, who died on the third day, I found him on the first day in deep torpor, and on the following morning somewhat conscious. In the evening muttering delirium set in, soon followed by coma, and early the next morning he died. In slighter cases it was not unusual to see a period of somnolence, with starting and grinding of the teeth, passing away after a few hours, and attended by slight nocturnal delirium. Such patients were easily aroused, and then returned intelligible answers to questions. In one very long continued case of this kind, in a middle-aged, highly intelligent man, there arose during the course of the disease an extreme morbid irritability, attended with so much weakness, that even during convalescence the patient was unable to undertake the smallest mental occupation. In another very acute case, in a strong girl of 15, there was neither delirium nor somnolence during the whole course of the illness; but the girl fell into a state of great mental exaltation, expressed at first by violent, and afterwards by despairing outcries about her condition and illness. With such sensorial disturbances great general restlessness was commonly united, so that the patients, when not soporose or comatose, would toss themselves to and fro in bed, and were almost absolutely sleepless, or obtained only a restless sleep with startings, and so light that, during its continuance, they showed consciousness of pain by groans. It was only during the height of the disease that this sleeplessness appeared to be so constant that any patient who was found apparently sleeping could be at once certainly pronounced to be somnolent, while the subsequent occurrence of quiet sleep was to be considered as an indication of a very favourable change in the case. I observed such an instance in a girl 11 years old, who, after severe sufferings for fourteen days, at last slept quietly for some six hours, and awoke almost convalescent.

A not less constant and characteristic phenomenon is the tetanic spasm of the neck, which is usually developed soon after the commencement of the disease, and which in farther progress becomes a complete opisthotonos, or, as in one of the cases that I saw, a pleurosthotonos, and that under all circumstances occasions very much pain to the patient, since it constrains him to lie always in one position on his side; and, even when present in a less developed degree, is sometimes continued far into convalescence. I have seen

many cases, both in children and adults, in which the patients had almost entirely recovered, but in which they still had a stiff neck or a head drawn back, and in which any attempt to bow the head produced acute pain in the neck. In three children, aged respectively 1, 6, and 13, I found, from the fourth to the sixth week of the disease, besides extreme emaciation, a strongly marked opisthotonos. This tetanic spasm was not at all times equally developed; when the cervical spasm was very strong, the head was drawn back almost to a right angle with the spinal column, and when a high degree of opisthotonos was also present, the unfortunate patient lay with the trunk curved into an arch, the feet turned outwards, and drawn backwards towards the loins. In five cases I saw at the same time trismus; of these five one soon died; the fifth patient, whom I saw for the first time in the third week of his illness, suffered from trismus according to the report of his physician, and also from opisthotenos in the first days of his illness, but this in a short time relaxed.

Together with this phenomenon, but wholly independent of it, we must mention another symptom, also arising from the spinal system, and also among the first and the most enduring occurrences of the disease. This is a high degree of hyperæsthesia of the skin, which was generally manifest over the whole surface of the body, and was not seldom so acute that the slightest touch produced intense pain, and would even arouse the patient to consciousness out of deep sopor. In many cases this symptom was entirely wanting, and in young children I could never obtain any certain evidence of it. In other cases it continued during the whole of the disease, and even into the period of reconvalescence; when the skin of the cervical region, with or without spasm of the subjacent muscles, remained the seat of more or less hypersensitiveness.

Among the less frequent, but still not unusual nervous phenomena of the disease, were various spasmodic affections, in the form of tonic muscular spasm, especially of the eyes and of the extremities (thus I once saw a rigid contraction of the fingers, together with paresis of the arm, and strabismus convergens of the left eye), or in the form of convulsions, which either affected the facial muscles alone or those of one or more of the extremities as well, sometimes the upper and lower extremities of the same side, and which were seldom severe, but displayed themselves in slight tremor of the arms and feet, or a slight play of the facial muscles. These

appearances have not only been seen in the more severe and fatal, but also in the slighter cases. The appearance of these spasmodic affections is not peculiar to any single period of the disease. I have seen them, together with delirium and somnolence, within the first twelve hours of the outbreak, then for a time disappear, and reappear one or two days later. In other cases, on the contrary, they first show themselves towards the end of the disease, together with other terminal appearances; and, in others again, they precede an immediately following paralysis or paresis of the extremities affected.

Less common than spasm is paralysis, and it is highly worthy of notice that it was usually very soon recovered from. I saw one case of hemiplegia, of the right side, that, after existing five days, and spreading from below upwards, began to disappear, so that in the lower extremity almost complete mobility was restored. In a boy twelve years old, in whom a paralysis of the right upper extremity began to shew itself on the seventh (?) day of the illness, I saw five days later only a slight paresis of the upper arm. In a girl, 2½ years old, I found paresis of the left arm with contraction of the fingers; and was informed that the child, about fourteen days earlier, had been attacked by complete hemiplegia of the left side, and that the mobility of the lower extremity had already been several days restored. In a boy of 15, both upper extremities were affected by paresis at the outset of the disease, so that he could only raise his arms with difficulty, and could not carry them to his head; and this condition began to improve after five or six days. In two cases I have seen blepharoptosis, once of the left, and once of both eyelids; and both cases terminated rapidly in death. Twice I have seen akinesia of the abducens oculi nerve(with convergent strabismus). In one case there was also amaurosis, and the affection was already of long standing. The other case, after a duration of several days, was already beginning to improve. In both the left eye was the one affected. Lastly, I have twice seen paralysis of the speech, or rather of the power of articulation; so that the patients, girls of 6 or 8 years old, were only able to make unintelligible attempts at speech. One of these patients died upon the third day; and the other only came under my notice in the eighth week of the disease, when, besides great emaciation, she was also suffering from impairment of sight and hearing. I will also mention in this place two accidental complications that may arise during the disease, and that must be referred to a

central origin: the first, a sensation of acute pressure upon the chest, with difficulty of breathing, of which a few patients complained greatly; the second, cardialgia and enteralgia, which, as already mentioned, are comparatively frequent in the premonitory stage, and which sometimes arise during the course of the disease itself, and then (as in the case of a girl of 15, on the fourth day) last for several days, and attain a considerable intensity.

Among morbid phenomena displayed by the organs of sense, are many disturbances of the visual and auditory apparatus, which have come under observation, but of which only the external manifestations can be described. With regard to the eyes, I have observed that the state of the pupils has been in a high degree variable and inconstant. Not unfrequently, even in the most acute cases, the pupils appeared generally normal; in others, in which the disease was rapidly fatal, I found, when there was a predominance of symptoms of irritation, the pupils usually reacting but little to the stimulus of light, but as often contracted as dilated, and in both conditions so variable, that, when in the morning the pupils were much contracted, they were often either normal or dilated ten or twelve hours afterwards, without any corresponding change having occurred in other matters. In a case that ended fatally within forty-eight hours, the pupils, on the second day, were so much dilated, that only a ring of iris, a line in breadth, remained visible. In a similar case, in a girl of 23, dying on the fourth day, the pupils on the second day were much dilated and immoveable; and, on the evening of the same day, when a furious delirium had set in, so that the patient could scarcely be kept in bed, they had become much contracted. It was only in very acute cases, in which paralytic complications occurred rapidly, that the pupils were found constantly dilated and fixed. But in more prolonged cases, the pupils exhibited the same variable and inconstant condition; but, in the later stages, they were usually dilated, and often remarkably immobile. Thus I saw a case, complicated with pneumonia, on the thirteenth day of the disease. There was still a high degree of hyperæsthesia, with acute headache, slight cervical rigidity, and a small rapid pulse. The pupils were much dilated, but not fixed. The same in another case, in a boy 12 years old, on the eleventh day of the disease, but with less reaction to light; also in the case of a girl 6 years old, in the fifth week of the disease, with accompanying deafness.

Amaurosis has been decidedly very unusual. A girl of 15, whom I saw for the first time in the fifth week of the disease, suffered from amaurosis of the left eye, together with akinesia of the abducens nerve, and convergent strabismus, on the same side. I could not determine, however, at what date the amaurosis had arisen. In two other cases, that I first saw in the eighth week of the disease, amaurosis of both eyes and extreme marasmus were present; but here, also, I could not determine the time of the commencement of the affection. In a boy 2 years old, who became convalescent after several weeks of suffering, I found hypopyon of the right eye, in consequence of iritis, with posterior synechia, and the pupil turbid from exudation; and in a boy of 7, who was attacked by keratitis in the third week, I found in the eighth week a corneal ulcer undergoing cicatrisation. Lastly, a peculiar phenomenon was the conjunctivitis that I observed during the course of the disease, in many places, and that, in comparatively numerous instances, was followed by mild blennorrhœa. This affection in some cases showed itself at the beginning of the disease, and in other cases not until a later period, and continued even far into reconvalescence. As I first saw this phenomenon in several patients in places in the circles of Berent and Carthaus, I believed that possibly it might be a consequence of the irritating influences of the smoke that filled the miserable cottages of the inhabitants. Afterwards, however, I found the same affection in Dantzic, and in the Dantzic circle, where the presumed cause was not in operation; and I was therefore led to suppose the process to be similar to what is often observed in other severe diseases, such as typhus fever, in which various profound disturbances, such as maladies of the cornea and their consequences, are well known to be developed.

Very much more frequent than amaurosis was *deafness*, which usually showed itself in the early (from the second to fourth) days of the disease, and much more rarely, as it appeared to me, at a later period. This deafness, at the time when I concluded my observations, had only been recovered from in comparatively a very small number of instances. In some cases, as far as I could ascertain, the deafness was preceded by noises in the ears, once by acute pains in the ears and aural hallucinations, the patient, a boy four years old, thinking that he heard music, human voices, the songs of birds, and other sounds.

Among the disturbances of the digestive organs, the first to be mentioned is vomiting, which was among the earliest

and most universal, but commonly transient symptoms of the disease. Vomiting sometimes occurred in the premonitory stage, but usually made its appearance with the commencement of severe headache. More or less profuse, it would usually recur several times, or repeatedly, during the first twenty-four or thirty-six hours. Sometimes it would continue many days, or even throughout the whole course of the disease; and, lastly, it would sometimes return after having ceased for a time. In thirty-nine cases of completely developed disease, in which I either observed or inquired into this occurrence, vomiting was absent in eight. In four cases, there was only slight and temporary heaving; and, in one of the remaining twenty-seven, a girl of 18, the vomiting ceased on the first day, returned on the sixth day, and then continued for forty-eight hours. The vomiting was evidently due to an irritation of the pneumogastric nerve from cerebral disorder, since it was mostly either excited or aggravated by the patient sitting up. There was scarcely any gastric disturbance, so that, at the beginning of the disease, and throughout acute attacks, the appearance of the tongue was almost normal. Rarely, and usually only after several days' duration of the attack, it displayed a slight whitish or yellowish coating; and only in very prolonged cases, with development of a typhoid condition, did the tongue become thickly coated, or red, brownish, dry, and fissured.

A yet more constant condition than vomiting was a very obstinate constipation, often only to be overcome by repeated drastics, and usually commencing with the disease, and continuing throughout its entire duration. In all the cases that I observed, this condition was constant; although once, in a boy of 15, probably in consequence of some error in diet, diarrhœa commenced on the seventh day, to be again followed, after a short time, by obstinate constipation. In two other cases that came under my notice, the patients, a few hours before death, and while lying in deep sopor, passed fluid evacuations involuntarily. The appetite, even in slight or in no participation of the sensorium, was commonly destroyed during the whole course of the disease, and even until reconvalescence. In two cases that came under my knowledge, towards the end of the disease there arose a hunger bordering on bulimia. One of these patients was a girl, 6 years old, and the hunger commenced in the third week of the disease, after previously complete anorexia. The second case was in a boy 5 years old, whom, in the seventh week of the disease, I found wasted to a skeleton.

With reference to the condition of the abdominal organs, I have to record that I was unable to retain evidence of splenic enlargement in any of the patients that I examined. Of all that I saw, I only neglected this examination in from ten to fifteen cases, in which the extreme hyperæsthesia of the little patients rendered it impossible to perform it satisfactorily. Some physicians have assured me that they had found splenic enlargement in several cases. I was also unable to discover any special derangement of the functions of the genito-urinary system. The urine appeared usually to be quite normal; although, in the deep sopor at the commencement of the disease, it was sometimes retained and sometimes emitted involuntarily. In one case, in a man 40 years old, in whom the disease was very lingering, and of an intermittent type, the urine, in the third and fourth weeks, became occasionally very turbid and strongly acid, and threw down a deposit of amorphous lithates. This occurrence was frequently repeated, and was always attended by improvement in the patient's state. In another very well marked case, in a patient 15 years old, the urine on the third and fourth days was reddish-coloured, strongly acid, with a moderate deposit of triple phosphate. The quantity of the urine appeared somewhat increased.

The activity of the skin, as a secreting organ, exhibits in the ordinary course of the disease nothing abnormal. In the intermittent type, the retrocession of the paroxysm is usually attended by an abundant sweat. Under other circumstances, a paralytic sweat has been now and then observed, in which the skin feels cool and damp, and which indicates a fatal termination to the disease.

Among the more infrequent phenomena of the disease, the occurrence of various exanthemata requires especial notice. The most common of these assumed the form of an *eczema*, and was most frequently observed upon the lips, as a so-called herpes labialis. From the lips the disorder has been seen to spread, sometimes over the cheeks to the eyes, sometimes along the nose to the forehead, once downwards over the neck to the upper arm, and once, in a soldier of the Dantzic garrison, it appeared simultaneously upon the face and upon the inner surface of the thigh. In a boy of 5 years old, an eruption like that of measles appeared upon the skin; and in one of 8 years old, who died on the third day of the disease, forty-eight hours before death roseola was observed upon the arms and back, and disappeared after remaining twenty-four hours. The case of a little girl, one year old, in

whom the exanthem assumed completely the character of scarlet fever, was highly interesting. It appeared first, on the third day of the disease, as eczema of the ear, and four days later developed itself into a scarlatinal redness, with slight swelling of the skin, affecting first the face, spreading to the neck and upper extremities, and fading on these parts as it advanced over the chest, abdomen, and lower extremities. In three days it quite disappeared; but the eczema of the face continued. Complete desquamation followed. I must here especially remark that the eruption in this case was decidedly not scarlet fever; on the one hand, because the characteristic phenomena of cerebro-spinal meningitis were present; and, on the other hand, because the course of the eruption itself, as described, differed in many points from that of scarlet fever. There was no trace of the affection of the mouth and mucous membrane of the throat characteristic of scarlet fever, nor was there the acceleration of pulse peculiar to that disease; the pulse never attaining, either before the appearance of the exanthem, or during its continuance, a greater frequency than 100 beats in the minute. With regard to the period of occurrence, and the critical signification of the eczema so frequently observed, I can only say that it showed itself in all stages of the disease, and that, as far as I can judge, it was entirely without prognostic signification. I have seen it in full development in marastic persons in from the sixth to the eighth week of the disease.

As a peculiar phenomenon, I have also to mention the occasionally observed occurrence of slight œdema, especially of the extremities and about the joints. In a very well marked case, in a girl 8 years old, I found œdema of the backs of the hands and of the face, which was developed on the fifth day of the disease, and still existed when I saw the patient two days later. In another case, in a boy of 4, at the beginning of the attack there was a painful œdematous swelling of the joints of the hands, and some days later, when this swelling had subsided, a similar one made its appearance about the right knee and foot, and still existed, although diminished, when I saw the patient on the fifteenth day of the disease. In a third case, only made known to me by medical report, the hands and feet of the patient were affected by a hard swelling, that had less the appearance of œdema than of induration of the connecting tissue.

Lastly, it is necessary to give prominence to the fact that profound disorders of other organs, or so-called complications, were very rarely observed. In one case, in a boy 8

years old, on the fifth day of the disease there arose a slight bronchial catarrh. In a fatal case, in a girl of 15, I observed, in the fifth week of the disease, the development of hypostatic pneumonia. In another case, in a girl of 13, pneumonia commenced on the fourth day; and, on the eleventh day, I found the whole right lung infiltrated, but with resolution progressing in the lower lobes. The patient was greatly emaciated, and had a bedsore over the sacrum. In a very strong boy, of 3 years old, a considerable swelling of the parotid, with profuse secretion, arose in the second week; but remained wholly without influence upon the general condition of the patient. Lastly, in a girl of 16, diphtheria of the throat appeared during convalescence from epidemic meningitis, and produced marasmus, that terminated in death. The two last-mentioned cases I did not myself witness.

To the foregoing description of the various isolated phenomena observed during the course of the disease, I will now append some observations upon the character and course of the attack. It has been already pointed out by numerous previous observers, that scarcely any other acute infectious disease presents such differences in the grouping of its symptoms, such variations in the order and connection of its several characteristic phenomena, or so many and such great modifications in its general character and course, as epidemic cerebro-spinal meningitis. It is therefore extremely difficult to describe these variable conditions under any typical form, or to divide the course of the attack into any defined stages. From the results of my own observations I can confirm this statement, and I therefore renounce any endeavour to draw a perfect description of the disease. The following grouping may be considered as presenting the most essential phenomena, and those most peculiar to its developed forms.

After a preliminary stage, or even suddenly and without a preliminary stage, the occurrence of more or less acute shivering, with subsequent heat, very severe pains in the head, tension and spasm of the neck, commonly at the same time vomiting, early delirium alternating with somnolence, a rapidly developed tetanic rigidity of the neck, often passing on to complete opisthotonos, a high degree of general hyperæsthesia, frequently convulsions, much less frequently paralysis, continuing sleeplessness and constipation, and sometimes the appearance of an exanthem, in favourable cases a gradual retrocession of the symptoms, without any

critical phenomena, and a very slow convalescence, in fatal cases deep coma, small almost imperceptible pulse, cold moist skin, and other signs of a general paralysis.

With regard to the course of the disease we may distinguish,—

I. Cases of mean severity and rapidity, occupying from six to fourteen days from the commencement to convalescence, commonly terminating in recovery, but sometimes leading inevitably to death.

II. Cases of the so-called *meningite foudroyante* of French writers, commencing, like most acute diseases, with very intense symptoms, and terminating fatally in from twelve to seventy-two-hours. This form of the disease is comparatively frequent at the first outbreak of an epidemic, and furnished the largest contingent of fatal cases. I have myself observed several instances of this form, and numerous others are recorded by trustworthy observers. It seems very worthy of remark that such cases not seldom exhibit, from the first, indications of profound collapse, such as pallor of the face, blueness of the lips and extremities, very slow and sometimes thread-like pulse, deep coma and rattling breath, and that the patients die without any perceptible reaction.

III. Cases of less rapidity but of severe development, in which the patient eventually dies in a typhoid condition. I have seen some such in which, after from eight to fourteen days of illness, with dry and fissured tongue, fuliginous sordes on the teeth and lips, muttering delirium, and so forth, there were also present the characteristic symptoms of meningitis, the tetanic cervical spasm or opisthotonos, great hyperæsthesia, obstinate constipation, etc., etc.

IV. Cases of very prolonged course, so that after from five to eight weeks the patient has not yet entered upon convalescence, but is found still suffering from some more or less declared symptom of meningitis, such as acute headache, cervical spasm or opisthotonos, hyperæsthesia, or some local paralysis, and usually also from an extreme degree of marasmus. In a few cases of this kind I have seen death occur in the sixth or seventh week, from emaciation or paralysis, or I have found the patient in such a condition that a speedy fatal issue could be foretold with high probability.

V. Cases of an intermittent character, to which a very prominent interest attaches. The intermissions were more or less complete and regular, so that they assumed the pecu-

liar character of malarious disease. More frequently they were incomplete, so that they exhibited more of a remittent type, and were not regular. Among them, according to the appearance of the intermissions or remissions in the premonitory stage, in the course of the disease, or at the period of convalescence, we may distinguish,—

A. *Cases with intermissions in the premonitory stage*, in which:—

I. A long series of phenomena preceded the full development of the disease. Such a case was seen by myself and others in a girl 7½ years old, who, on the 19th and 20th of March, at the same hour of the afternoon, was attacked by very severe headache that lasted for several hours, and then disappeared so completely that the patient seemed quite well until the next attack. The pain returned on the 21st, 22nd, and 23rd of March, but in less intensity, and occasioning less complaint than at first. On the 24th it returned in great severity, and was forthwith followed by a complete outbreak of the disease. Sometimes these intermittent prodromal phenomena were attended by fever; and the headache was occasionally replaced by some other symptom, such as nausea, and more rarely vomiting, stiffness of the neck, slight somnolence, and so forth.

II. The preliminary stage consisted of a single attack, followed, after an interval of from twelve to sixteen hours, by the complete outbreak of the disease, which might assume either a continued, an intermittent, or a remittent type. Such a case was that of a boy seven years old, suddenly attacked in the night by acute feverishness, with headache, sickness, and great restlessness, and who, the next morning, seemed comparatively well, and remained so during the day. The following night a second attack ushered in all the characteristic symptoms of the disease, which was continuous, and so protracted that, eight days later, I found the patient with marked torpor of the sensorium, a small rapid pulse, considerable elevation of temperature, a herpetic eruption on the cheeks and lips, and so forth; but still obviously entering upon the stage of reconvalescence.

B. *Cases with an Intermittent Course of the Disease*, where:—

I. The intermissions were more or less complete, so that during the intervening periods all the symptoms were much relieved. In a few instances, the whole course of the disease was of this kind, commonly with quotidian exacerbations, up to the issue in recovery or in death; and in other

cases, after a few of such remissions, a continuous type was assumed. The following cases may serve as illustrations. M., a boy, 11 years old, was attacked, after he had suffered for a single day from slight bronchial catarrh, on the forenoon of the 17th of March, with chilliness, followed by heat, acute headache, vomiting, and furious delirium. In the evening all these symptoms subsided, so that I found the boy quiet, with undisturbed sensorium, slight complaint of headache, and the vomiting entirely ceased. The night passed quietly, and the patient slept for several hours. In the morning there was a second attack, also with violent delirium. In the afternoon the patient was soporose, the pupils were dilated and fixed, there was tetanic rigidity of the neck, and a small very frequent pulse. Death took place during the night. L., a boy 18 months old, was attacked on the morning of the 4th of April by fever, vomiting, somnolence, and other violent symptoms, that continued for some eight hours. There followed a remission, so that I found the patient sitting up, quite sensible, and with an appetite; some quickening of the pulse, with a flushed face and slight elevation of temperature, were the only signs to indicate the continuance of the disorder. On the morning of the 5th of April there was another attack, with vomiting, somnolence, strabismus, slight convulsive tremors of the extremities, and very rapid pulse. After several hours duration this attack was followed by a remission, and then by a third attack of less severity, after which the patient became convalescent.

II. Or the disease assumes completely the character of a malarious fever, without complete apyrexia, since we not only remark an alternation of exacerbation and remission proceeding from the local disorder, but each new attack commences with more or less fever, and frequently terminates with profuse sweating. The type of these attacks is often irregular, but sometimes distinctly quotidian or tertian, and the time of commencement appears to be most frequently the afternoon, less frequently the morning.

c. *Cases with intermissions in the stage of reconvalescence,* in which:—

I. Either the symptoms still remaining shew more or less periodic exacerbations and remissions, the former of such severity as to lead to belief in a relapse:

II. Or febrile attacks of quotidian or tertian type recur throughout the whole of the very protracted convalescence.

The convalescence from epidemic meningitis is, as has

been already many times observed, usually very slow, and beset by many sufferings and accidents. This applies not only to the most severe and well marked cases, but equally to those of slighter degree and shorter duration. The most remarkable characteristic of this stage has been the extreme emaciation and great weakness of the patients, an emaciation and weakness such as I have very seldom observed after other infectious diseases of such comparatively short duration. I found numerous patients, mostly children, between 3 and 12 years old, in the fifth and sixth weeks of the disease, wasted to skeletons, and so feeble as to be unable to quit their beds. The longest duration of the stage of convalescence that I saw was in a previously strong man, a soldier in the Dantzic garrison, who sickened on the 3rd of January, and who, on the 3rd of April, was still too feeble to return to duty. Convalescence was frequently disturbed by the continuance of some symptoms of the disease, as by headache, slight cervical rigidity, with pain in movements of the head, hyperæsthesia, or absence of appetite. All these conditions, as already remarked, were frequently seen to undergo more or less periodic exacerbations and remissions, with or without the simultaneous occurrence of fever.

From all the above narration it is evidently impossible to assign any specific time for the duration of the disease, or even of its individual modifications. Very rapid cases terminated fatally in from ten to twenty-four hours; while in a later period of the epidemic, as before mentioned, the disease commonly followed a slower course, in which death, when it occurred, did so in from twenty-four to seventy-two hours. In the well marked cases of the disease the mean duration would be from six to twelve days; in the less intensely developed from four to six days, and these periods, as already mentioned, would often be followed by a convalescence extending over several weeks. Disregarding hyperacute cases, death occurred most commonly during the first eight days, or between the fourth and the eighth; but sometimes at a much later period, especially when produced in consequence of the changes wrought by local processes, or from marasmus. Death from pyæmia in this disease I have neither witnessed myself, nor heard of in the experience of other physicians.

It is as little possible to speak with certainty about *prognosis* as about duration. I have seen cases that seemed very mild at their commencement suddenly increase in severity, and lead to speedy death; and others have been

seen by myself and others, that, in spite of very severe symptoms, underwent speedy improvement. Isolated symptoms appear to be of no more value, *quoad* prognosis, than the general character of the case. As a rule, the signs of nervous depression were more unfavourable than those of irritation, and a continuance of paralysis was absolutely unfavourable. Deep sopor or coma, a very small thready and arhythmical pulse, widely dilated fixed pupils, cold extremities, involuntary evacuations, and so on, afforded ground for an absolutely unfavourable prognosis; and so also did, as it seemed to me, the already described signs of profound collapse.

The *abortive form* of the disease observed in the course of the epidemic deserves a special description, since it not only formed a very large number of the cases, but also threw a clearer light upon the nature and character of the disease. This abortive form occurred in greater or less development. In many cases it was limited to the occurrence of severe headache, lasting for several days, often with feelings of tension in the neck and back, and with extension of these dragging pains to the upper extremities; phenomena that assumed completely the characters of a neuralgia, and that, as I often observed myself, and as was observed much more frequently by other physicians in the localities that I visited, often occurred in periodic attacks, like those of a malarious neuralgia. To this condition I must refer hereafter. In other cases a form of disease was developed that clearly indicated the march of an epidemic. With or without fever occurred severe headache, nausea, or even vomiting; the patients complained of dragging or even of slight rigidity in the neck; they were restless, slightly delirious at night, or somnolent; suffered, sometimes from the first, sometimes later, from continuous abdominal pain, resembling cardialgia or enteralgia; and when these symptoms had continued one or two days, convalescence was ushered in by some critical phenomenon, most frequently by profuse sweating, sometimes by copious epistaxis. In this abortive form of the malady the stage of convalescence was sometimes remarkably prolonged. I have chiefly met with this abortive form in places where the more developed form had also prevailed, and in some of these places the former has been extremely common. Among others, at the village of Skorczewo, in the circle of Carthaus, where, at the height of the epidemic, a very large proportion of the inhabitants, both adults and children,

were attacked by a more or less developed abortive form. Also, in the parish of Schöneberger, and especially in the small village of Kloden, in the circle of Carthaus, containing about sixty persons, nearly the whole of whom were attacked in the manner described in the course of a few days, both children and adults, so that the proprietor was compelled to have all work suspended for a time.

Upon the proportion of mortality, and the degree of fatality of the disease, I am unable to speak; since on the one hand I only possess a comparatively small number of exact observations, either of my own or of others, upon which any judgement on these points could be founded; and, on the other hand, the two questions bear a different relation to the actual number of cases—since one would refer only to those fully developed, and the other to the slighter cases intermediate between the fully developed and the abortive forms of the disease; I must therefore content myself with mentioning these separate questions separately. In two places in the circle of Berent, in which the epidemic had either ceased or was passing away, I obtained a return of all the occurring cases and of all the deaths, and have gathered from it the following results. In Kornen, a place with 350 inhabitants, there were thirty-four persons attacked, and eleven deaths, and the mortality was therefore 32·4 per cent. of the occurring cases. In Lippusch, a place of about 400 inhabitants, there were fifty cases and seventeen deaths, so that the mortality was 34 per cent. In Berent, of thirty-six fully developed cases, treated by the same physician, fifteen died, or 41·7 per cent. In the Dantzic peninsula the proportion of mortality was 30 per cent. In the Elbing level, at Keitelen, three persons died out of five attacked, or 60 per cent; and at Jungfer, twelve out of nineteen, or 63·2 per cent. The disease is therefore to be considered fatal in a high degree, especially when we remember that there are many cases of incurable blindness and deafness among the survivors.

So far as I have endeavoured in the cases under my observation to obtain *post-mortem* inspections, I have been met by infinite difficulties arising out of great public prejudice upon the subject; difficulties that were unusually great in a population among whom this prejudice was allied to certain religious considerations. I have only succeeded in making autopsies, and these not complete, in four cases; and the results of a fifth have been communicated to me by Dr. Frich of Schöneck.

In general, notwithstanding the season of the year in which the deaths took place, the decomposition of the bodies has been extremely rapid, so that within the first twelve hours large patches of discoloration have appeared, not only on the posterior, but also on the anterior surface of the body.

The first two autopsies here recorded were upon persons who had died within the first twenty-four and thirty-six hours of the disease; and therefore upon hyperacute cases, worthy of particular attention.

I. K., a boy of 15, a joiner's apprentice at Schöneck, was suddenly attacked on the evening of the 3rd of March with fever and headache. At night vomiting occurred, with delirium, great restlessness, sleepnessness, and tetanic rigidity of the cervical muscles. There was no remission, and death took place in thirty-six hours from the commencement of the illness. The autopsy was made on the morning of the 5th of March. The body was not wasted. The vessels of the dura mater and the sinuses were distended with dark fluid blood, the serum at the base of the brain was not much increased, and there was no trace of exudation. The meninges were extraordinarily hyperæmic, but displayed no turbidity to the naked eye. The brain was somewhat swollen, of normal consistence, and exhibited only a few vascular points on section. The lateral ventricles were much distended, so that the little finger could easily be pushed into the anterior and posterior cornua, and contained much serum, as did also the third ventricle. The three ventricles together contained rather more than three tablespoonfuls of fluid. The cerebellum was hyperæmic on section, the medulla oblongata and the cervical portion of the cord were normal, but the pia mater covering them was hyperæmic. The superficial layers of the cervical muscles were normal, the deeper layers congested, brownish, easily lacerated. This was the case recorded by Dr. Frick.

II. The next examination was in the case of a girl 2 years old, who died, after twenty-four hours' illness, with characteristic symptoms, but whom I did not see during her life. The corpse was not emaciated, the mucous membranes were pale, and there were large patches of *post-mortem* discoloration on both surfaces of the body. The examination was made sixteen hours after death. The dura mater was adherent to the bone along the longitudinal sinus, and much congested. The serum at the base of the brain was not increased. The sinuses and vessels of the dura mater

were distended with dark fluid blood. The pia mater was also much congested, but not turbid to the naked eye. There was no trace of exudation. The brain substance was firm, exhibiting very few vascular points on section. The ventricles were almost empty, the choroid plexuses much congested, the cerebrum, cerebellum, and spinal cord, quite normal. The spleen was small, contracted, remarkably hard and dry, its capsule somewhat turbid and wrinkled. All other organs normal.

III. Martha E. of Dantzic, 2 years old, was in good health on the morning of the 21st of March, and ate with appetite at noon. In the afternoon she was pallid and chilly, and restless during the night; not sleeping, and hot and cold by turns. On the 22nd she was pallid, complained of headache, vomited, became hot, and soon lost consciousness, becoming delirious and somnolent alternately. There was also cervical rigidity. On the 23rd, pulse 120, temperature elevated, pupils contracted and fixed, ptosis of both eyelids and akinesia of the abducens, trismus, extreme opisthotonos, general hyperæsthesia, deafness, continued somnolence. On the 24th the same condition, with clonic spasms of the left upper extremity, and complete unconsciousness. On the 25th she appeared to be *in extremis*, the pulse scarcely perceptible. On the 26th, in the morning, the pulse a little stronger; in the afternoon sudden paralysis and death. The autopsy was made twenty-four hours after death. The body was not emaciated, and the subcutaneous fat was well developed. *Post-mortem* discoloration trifling. The skull was extremely thin, and the anterior fontanelle still open. The dura mater strongly adherent along the longitudinal sinus, especially at the anterior fontanelle, and at the lambdoidal suture much congested; the vessels and sinus distended with dark fluid blood, containing some coagula. At the base of the brain about two ounces of greenish coloured serum. Arachnoid turbid, much congested, the pia mater covered by a gelatino-purulent exudation, especially abundant on the upper convex surfaces of the hemispheres, and next on the under surfaces of the anterior and middle lobes of the cerebrum, along the fissure of Sylvius, upon the pons and the chiasma. In the lower surface of the cerebellum, especially at the incisura posterior inferior, the exudation is more sero-purulent. The cranial nerves, except from the tenth to the twelfth pairs, were surrounded by pus. The lateral ventricles were moderately distended; the right contained some serous fluid, the left and the third ventricle about

half an ounce of sero-pus. The choroid plexus of the third ventricle was covered by a gelatino-purulent exudation; the left thalamus and corpus striatum, as compared with the right, were swollen and very vascular, and bleeding freely on section. The pons very vascular; the medulla oblongata and cerebellum less so. The spinal canal contained a thin greenish sero-pus, the spinal membranes were congested, the pia mater of the posterior surface of the cord was covered by a thin layer of gelatino-purulent exudation. The points of exit of the nerves on the left side, in the lower cervical and upper thoracic regions of the spinal column were surrounded by a thick pus.—(N.B. During life there had been continued clonic spasms of the left upper extremity).

IV. Emilie H. of Dantzic, 5½ years old, was somewhat unwell on the morning of the 16th of March. At midday she had shivering and heat, acute headache, vomiting, opisthotonos, hyperæsthesia; 17th, condition unaltered; 18th, a fresh febrile attack, with delirium and convulsions; on the 19th, continued somnolence; on the 20th, death. The autopsy was made twenty-four afterwards. The body somewhat emaciated, visible mucous membranes pale, *post-mortem* discolorations on both surfaces, cranium very vascular, especially at the sutures, dura mater congested, sinuses full of thin black blood, and containing a few grumous clots. At the base of the skull about two ounces of blood-tinged purulent serum; the pia mater lustreless throughout, and with turbid spots at many places, especially on the convexity of the cerebrum, at the base on the chiasma, and on the cerebellum. There was a moderate gelatino-purulent exudation on the convexity of the hemispheres, especially along the convolutions; on the base of the brain, about the chiasma and the lower surfaces of the anterior lobes, in the fissure of Sylvius, and partly also on the lower surfaces of the middle lobes. The pia mater was in some parts so firmly adherent to the brain, that the substance of the latter was torn by an endeavour to separate them; the brain itself was very vascular, the ventricles contracted and empty, the choroid plexuses very vascular, and also the middle lobes and the cerebellum. Of the cerebral nerves only the chiasma was covered by exudation. The spinal canal contained a sero-purulent blood-tinged fluid; the spinal membranes were strongly reddened, and the pia mater of the cord, from the medulla oblongata to the cauda equina, was covered, on the posterior aspect of the cord, with a gelatino-purulent closely adherent layer of exudation.

v. Bertha R. of Dantzic, 3 years old, was attacked in the afternoon by pains in the abdomen, headache, and some fever; soon followed by vomiting that continued all night, by great restlessness, delirium, cervical rigidity, hyperæsthesia. On the next day the condition was the same, the bowels constipated, the vomiting continuous, but there was some consciousness of what was said. The night was quite sleepless. On the third day, convulsions, delirium, afterwards deep somnolence; the urine passed involuntarily. On the fourth day somewhat more consciousness, continued cervical rigidity and hyperæsthesia, strabismus, and small, rapid pulse. On the fifth day the same, fixed dilated pupils, bowels constipated, abdomen tympanitic. The loss of sleep and the somnolence continued for the next eight days, the pulse remaining small and rapid. During the last few days a little cough, and the patient died on the thirteenth day with indications of general paralysis. The autopsy was made twelve hours after death. The body was emaciated, surface and visible mucous membranes pale, with *post-mortem* discolorations upon the back and lower extremities, and numerous miliary vesicles upon the abdomen, thorax, and upper extremities. The cranium congested, dura mater much congested, the arachnoid dry and lustreless, the pia mater turbid, covered with a pale gelatinous greenish exudation on the convexity of the hemispheres, and especially in the course of the distended veins. Both of the lateral ventricles contained a quantity, five or six ounces, of greenish serum, mixed with flakes of purulent matter; and their posterior cornua were dilated. The optic thalamus was covered with pus; its substance, as well as that of the corpus striatum and the hemisphere, a little congested. There was purulent exudation in the third ventricle; on the convex surface of the cerebellum a thin layer, and on its under surface, on the pons and medulla oblongata, a very thick layer of firmly adherent, gelatino-purulent deposit. The substance of these portions of the brain was pale. At the base of the brain about two ounces of thin pus; the sinuses distended with dark fluid blood. The dura mater of the cord much congested, and the pia mater of the cord covered, on the whole of the posterior surface, with a pale green thickly gelatinous purulent exudation; and, on the anterior surface, exhibiting purulent deposits here and there. The lungs were much congested, the posterior portions in a state of hypostasis. There were no tubercles. The heart contained dark blood, partly fluid, partly coagulated; mucous membranes of the

intestines pale, with no swelling of the follicles, either the solitary glands or Peyer's. The spleen quite normal, not congested; as also the liver and kidneys.

CAUSES OF THE DISEASE.

Among the conditions that have evidently exercised a decided influence upon the extension of epidemic cerebro-spinal meningitis, the first place must be given to relative age. Although elsewhere, in countries previously visited by the disease, as in France, adults, and especially soldiers, were chiefly affected (a condition that was repeated in North America, in the Netherlands, and in the epidemic at Berlin in the winter of 1863-64), in the government province of Dantzic, as also in Denmark, Sweden, and subsequently at Bromberg, Stettin, and other places, the epidemic attacked mostly the period of childhood, especially the ages below fifteen. The tables of mortality are conclusive upon this point. By far the greatest mortality was among children from one to five years of age. If we consider that children up to five years form 11·15 per cent. of the population, and that the number of individuals under one year is about one third, rather more than less, of this 11·15 per cent., so that therefore the ages from one to five years form 7·43 per cent. of the population, we shall find that the mortality from meningitis, between these ages, has been enormously large. Next in point of mortality follow the ages between five and ten years. Between ten and fifteen the mortality falls considerably, and for the higher ages it becomes small. I must, however, expressly observe, that the mortality forms no certain standard for the prevalence of the disease; since the experience of all observers teaches that the disease is far more fatal to young children than to adults, or even to older children. A comparison between the numbers of persons attacked at different periods of life, although showing a considerable difference, might not show so great a one as that in respect of mortality; but such a comparison, with reference to the districts mentioned, I am not in a position to make. With regard to the mortality at ages above twenty, I must mention that I found in the death lists the names of several persons between forty and fifty, and the greatest age attained by any of those who died was in the case of a married couple in the circle of Carthaus. The man was 60, his wife 54, and they both died within a few days, the wife after two days' illness, and afterwards the man still more quickly.

In a far less proportion than age can sex be recognised as a predisposing condition favouring the extension of the disease. The numbers to be dealt with are so small, that no great error can be committed if we assume that the males and females are equally numerous in the population; and we find that the mortality was, in Berent, 206 males and 175 females; in Carthaus, 196 males and 202 females; in both, 402 males and 377 females, so that the males have suffered in a somewhat higher degree than the females; but the difference appears to me to be too inconsiderable to deserve much weight.

Lastly, it is a noticeable circumstance that by far the greater number of children attacked, that I saw, were declared by their relatives and medical attendants to have been, before their illness, healthy, strong, and even blooming; and also that a few of the patients more advanced in life were described to me as having been especially strong and healthy.

It has many times been remarked by earlier observers that epidemic meningitis is chiefly a disease of winter and spring; and seldom continues as an epidemic after spring is over, but usually disappears with the advent of permanent elevation of temperature. It is but a step to draw a conclusion with regard to the influence of cold, and especially of winter cold, in the causation of the disease; and, in the epidemic observed in the government province of Dantzic, an attempt was made to show a causal connection between depression of temperature and the general extension of the malady. It was said that the acme of the epidemic coincided with the coldest time; that the proportion of sickness and mortality bore a definite relation to the rise and fall of the thermometer; and that the occurrence of cold sharp north-easterly winds exercised an especially unfavourable influence. In order to determine the question from a purely objective standpoint, and in the most exact possible way, I have constructed a table containing the mean temperature of each day, from the 7th of January to the 23rd of March, and the daily number of deaths. To use this information we must bear in mind that not the day of death, but the day of the commencement of the disease, is the matter for consideration; and therefore, three days being assumed as the average period of duration, we must compare the mortality returns of each day with the temperature of three days before. I gather from the table:—

1. That the epidemic commenced in the circles of Berent

and Carthaus when a comparatively mild temperature (from 0·3 to 4·1) prevailed, a milder temperature than was again observed up to the 23rd of March.

II. That in the circle of Berent one acme of the disease occurred between the 12th and 23rd of February, and corresponded to the cold time between the 8th and 17th. A second increase of the epidemic, from the 2nd to the 15th of March, followed closely upon a very marked depression of temperature.

III. That the epidemic in Berent culminated exactly at the time when the highest state of the thermometer for the whole winter was observed (from the 4th to the 17th of March); and therefore at the same time with the second increase of the disease at Carthaus; and, lastly,

IV. That when the temperature of single days is compared with the amount of sickness, we do not find the slightest constancy of relation between an especially low temperature and an especially large amount of sickness or mortality.

While considering this question, I will not omit to mention a circumstance that much impressed me, and that an unprejudiced man, who had specially applied himself to the study of the influence of winter cold upon the disease, had an opportunity of observing in his own children. At a time when, at his place of residence, and in its vicinity, the pestilence so prevailed among the children of the poor, that, in a parish of some 4000 inhabitants, eighty-two, mostly children, died, he exposed his own family, without fear, in comparatively light clothing, to the most severe cold of winter, and to all winds, without any of them suffering. The almost constant occurrence of the disease in winter and spring certainly shows, nevertheless, that there is some causal connection between it and the characteristic temperature of these seasons; but in examining into this connection it must be remembered that the prosperous classes, who on evident grounds are far less able to resist the injurious influences of temperature than poor people who are much more inured to them, have yet suffered from epidemic meningitis in a far less degree than these; insomuch that, in many places, the pestilence has almost entirely spared the more wealthy portion of the inhabitants. On all these grounds I cannot exclude the suspicion that, although the temperature of winter and spring may have some direct influence upon the genesis of the disease, the modifications in the mode of living incidental to these seasons exert, in a far higher degree, an influence favourable to the presence of this, as of many other infectious maladies.

Soil and situation, in this epidemic, as in previous ones, appear to have been wholly without influence upon the presence or the extension of the disease. I found it as prevalent, as general, and as malignant, upon the sandy or moorlands of elevated plateaus, as upon the clay or alluvium of low levels. The speculative ætiology which seeks to explain everything by marsh malaria has sought to bring epidemic meningitis into causal connection with this hypothetical agent; and has found, in the numerous instances of intermission in the disease, a farther argument in favour of its malarious nature. I have repeatedly borne testimony against lax logic in conclusions upon ætiological questions, and especially against the inclination to refer all possible diseases that have occurred in marshy or malarious situations to a malarious origin. In this case I must adduce evidence of the presence of the malady in the high localities of the province, in which neither marsh influences nor the endemic prevalence of malarious disease existed, as a proof that its presence in the moist portions of the low levels had no connection with their peculiarities of soil, and I will hereafter completely disprove all the grounds on which the assumption that the disease is malarious has been made to rest.

I proceed now to the consideration of a circumstance that, according to my conviction, exerts the most decided influence upon the presence and the extension of the disease—I refer to the existence of unfavourable hygienic conditions, such as arise from social misery, and are known as the most essential predisposing causes of many other infectious diseases. It cannot be denied, however, that cerebro-spinal meningitis, in many places where it prevailed epidemically, did not spare the better situated and more favourably placed classes, as I myself observed in the towns of Dantzic, Berent, and Schöneck, and as I heard from medical reports in other places. Still by far the greater number, both of occurring cases and of deaths, were found among the lowest and poorest classes, and therefore the greatest extension and intensity of the disease occurred in those places where a poor and indolent population was crowded into damp, miserable, and filthy huts, the rooms of which, shut up with the most careful solicitude by their occupants, contained an atmosphere loaded with putrid emanations and products of decomposition of every kind. In not a few places and parishes of the circles of Berent and Carthaus, in which the above described conditions were present in a degree and intensity unknown elsewhere, the

disease was almost entirely limited to the part of the inhabitants influenced by them; and in places where cases of the disease occurred also among the more prosperous classes the mortality among them was much less than among their poorer neighbours.

It is necessary to speak also of a circumstance that bears a very definite relation to the question here ventilated—I mean the occurrence of a group of cases in a single family or dwelling, since such an occurrence has only been observed under the unfavourable conditions before described. I have collected a comparatively very considerable number of instances in which an aggregation of fatal cases occurred in one family or house; and in many of these instances I have found what might, *à priori*, have been expected, that the aggregate number has been increased by the occurrence of other cases that were not fatal. I disregard the very numerous instances in which two individuals of a family died within a short time of one another; and will here limit myself to those in which nearly all the children of a family or a household were attacked. In Alt Kischan, in the family of Tessmer, two children, aged respectively six months and two years and a half, died of epidemic meningitis very nearly together. A few days later, two children of widow Braun, living in the same house, and aged respectively five and eight years, were attacked, and after fourteen days I found them in a state of great misery. At the same place, in the family of Zaddach, all four children were attacked nearly together; of these, one soon died, and I found a second convalescent, and the other two very ill. At Kornen, in two dwellings under the roof of the same poor cottage, only separated by a narrow entrance, were attacked the following:

I. In one room, two children of the family of Zinda, a girl of six and a boy of two and a half years, who died on the 11th and 14th of January; and in the same room, two children of the family of Schutta, a girl of six and a boy of two years, both of whom recovered.

II. In the adjacent room, a boy Polack, nine months old, who was attacked with most characteristic symptoms, and died on the 15th of January, after twenty-four hours' illness. At the same place and under similar conditions, three children of the family of Schuhst were attacked, aged respectively two and a half years, one year, and three-quarters of a year, and they respectively died on the 15th of January and on the 4th and 9th of February; also a boy, Kalac-

ziewitz, and lastly, two sisters, Plate, aged 18 months and 6 years; a girl Niemcziek, 20 years old; and a boy, Chichoz, 4 years old, of whom the two last named recovered. There were therefore eight cases of the disease in a single house, and five of them ended in death. At Olpuck, in the family of Galunsky, five children sickened, aged 4, 13, 15, 16, and 18 years, of whom a girl of four died on the 19th of February, and a boy of thirteen on the 20th. At Wigonin, in the family of Zywicki, two children, boys of five and seven, died on the 22nd and 23rd of February; and five other children were attacked, some of whom I found recovered, and the others improving. At Oberhölle, in the family of Kapahnke, who lived, ten persons, crowded into one small and dirty room, at the time of my inquiries, two children, aged 4½ and 2 years, had already died (on the 8th and 15th of March), and two others were then suffering from the disease. In Ober Buschkau I found, in one house, a boy, Truhn, who sickened on the 10th of March, and was convalescent; and in the adjacent room, a girl, Jahnke, 13 years old, sickened on the 13th of March and died on the 20th; a boy, Malonen, 4½ years old, sickened on the 18th and died on the 21st, and his brother sickened on the 21st and died on the 22nd. To these statements, which I might increase by a great array of similar ones, I must add that such cumulative instances of cases and deaths in one family or dwelling, mostly occurred very closely after one another, commonly only three or four days apart, and seldom at longer intervals; and that such facts lend support to the belief that *the disease prevailed exactly in that season of the year in which, on account of inclement weather, many individuals were crowded together into small and dirty rooms, kept constantly closed by their occupants, and from which all ventilation was excluded, and in which the before-mentioned unfavourable hygienic conditions were extremely perceptible.*

Closely allied to the foregoing questions is that upon the channels of contagion through which the disease is lighted up or propagated: a question that has been denied by observers in the most various parts of the world in which epidemic meningitis has hitherto prevailed. I leave undecided how much weight should be attached to the facts already narrated, or to those which follow, as data for a positive solution of this doubt; but they certainly should not remain unconsidered, although I am far from deducing from them at present any conclusive inference with regard to the contagious extension of the disease.

I. On the 8th February, at Szakam, Kreft, 20 years old, was attacked with sickness, cervical spasm, paralysis of the right side, and other characteristic symptoms of epidemic meningitis. He was nursed by the daughter of the schoolmaster, Wallradt, from Sullenczyn, who came to Szakam for the purpose. After the death of Kreft, the woman Wallradt returned home, soon sickened, and died on the 26th of February. With the exception of a boy who died on the 15th January, this was the first fatal case in Sullenczyn.

II. To the interment of the girl Wallradt the family of the steward Kreft from Podgass came to Sullenczyn, where the funeral obsequies, as usual, were performed with an open coffin. After the return of the Kreft family to Podgass, their child three months old sickened immediately with symptoms of meningitis, and died within twenty-four hours from the commencement of the disease. Then Darvikowsky, from Borowilass, who had accompanied the Krefts, was attacked, and died on the 2nd of March; and lastly, Ottilie Reckniewitz from Podgass, four years old, daughter of the schoolmaster there, had also been to the funeral, and died on the 7th of March.

III. At Eggershütte, in the family of Schröder, two children died of meningitis, of the ages of three and a-half and one and a-half years, one on the 27th of January, and the other on the 7th of February. The clothes of the deceased were taken to Semlin, and came into the possession of the girl Krause, 5 years of age, who soon sickened, and died on the 14th of February.

IV. In Grabenhütte, the conveyance of the disease from one dwelling to another, and from the place to neighbouring localities, has been repeatedly observed.

On the other hand, however, it cannot be concealed that the majority of physicians and of the laity, in reply to my inquiries, have expressly denied the conveyance of the disease; that I myself, in several of the localities first attacked in the circles of Berent and Carthaus, have been unable to discover a conveyance of infection; that I have many times convinced myself how, notwithstanding the continued living together, and even sleeping together, of certain individuals, one of them might be attacked by meningitis and the others escape; and that many places holding open communication with others visited by the pestilence, either were not attacked until a much later period, or sometimes entirely escaped. I think, therefore, that the question of the contagious exten-

sion of epidemic meningitis must at present be regarded as an open one, although common sense seems to require, in view of the possibility of such contagion (I remember how long it was before the same question was satisfactorily solved with regard to cholera and typhoid fever), that all unfavourable hygienic conditions, such as the overcrowding of dirty and miserable cottages, the accumulation of decaying refuse, the absence of ventilation, and so forth, which are favourable to the formation of a contagion, and to the presence and extension of the disease, should be obviated as much as possible.

NATURE OF THE DISEASE.

I proceed now to reply to the question as to the opinion which the foregoing facts have led me to form with regard to the nature of the malady; whether, the question being so far determined as to number it with the infectious diseases, it should be considered as something *sui generis*, or only as a peculiar modification of an infectious disease previously known.

The first and second of these questions must, I believe, be answered in the affirmative; the third in the negative. In epidemic cerebro-spinal meningitis, we have to deal with a malady that has extended itself, not only to a few places, but over whole provinces, and extensive tracts of country; and, as the observations of late years have proved, has appeared as an epidemic in the most different points of whole continents, and then, after long prevalence, has from time to time completely disappeared from these localities, without any change in the mode of life of the inhabitants, or in telluric or atmospheric influences, by which either the sudden outbreak or the sudden disappearance could be explained. Moreover, it is specially important that the malady has occurred, within the last decennium, in many countries of Europe and in North America, as well as in the districts of West Prussia that I visited; and in none of these places, at least for centuries, has it been previously observed. There can, in my belief, be no question that the disease stands in pathogenetic relation to a specific morbid poison, analogous to those which lie at the root of other acute infectious diseases, but of which the origin and nature are completely unknown, and the specific character of which, as well as its actions upon the organism, are known only by the identical character of the physiological and anatomical disturbances that it excites. As I have already declared

elsewhere (in my *Handbook of Historical and Geographical Pathology*, vol. ii, p. 624), I believe that epidemic cerebro-spinal meningitis must be placed with dysentery, diphtheria, and other similar infectious disorders, in the sense that it differs essentially from other forms of disease of the same class, such as malarious fever, typhus, yellow fever, and so forth, in the localisation of its effects upon one organ. That certain external conditions exert an influence favourable to the presence and the extension of the disease, appears to me to be undeniable. This applies, in the first place, to conditions of climate, in so far that an experience extending over many years, and many widely distant parts of the earth's surface, shows that the disease has prevailed chiefly —nay, one might almost say exclusively—in winter and spring. It applies also, as my own observations show, to certain conditions arising out of social position. That all these and other such external conditions are only influences favourable to the development of the disease, and not its actual causes, follows directly from the consideration that all these conditions have been in operation from all time, while epidemic cerebro-spinal meningitis was first generally diffused in a very recent period; and, in this recent prevalence, has only visited certain localities, and has spared others, which could not be distinguished from the former by any differences of terrestrial, or climatic, or social considerations.

The question about the infectious nature of epidemic cerebro-spinal meningitis must, it appears to me, be decided in the affirmative; and indeed there is now scarcely a doubt remaining in the minds of thoughtful practitioners upon the subject. It is quite otherwise with the question whether the meningitis be a disease *sui generis*, or a peculiar modification of one previously known, such as typhoid or malarious fever.

From the ambiguity of the expression, "typhoid diseases," and from the arbitrary manner in which this expression has received, under the influence of a desire to generalise, a more or less extended signification, the question "whether epidemic meningitis be a form of typhus" presents itself under different aspects to different inquirers. It is therefore necessary that any one who attempts to reply to it, should at the same time state the meaning that he attaches to the words, "typhoid diseases." My own definition, which would be agreed with by most observers, rests upon an anatomical and symptomatological basis. It includes the rhythmical course of the disease, the typhomania, the high degree of fever,

or the high temperature, the appearance of an exanthem, the acute enlargement of the spleen, the affection of the bronchial mucous membrane, and the common participation of the lymphatic glands, or of the organs anatomically and physiologically resembling them, especially the splenic follicles and the intestinal follicles; symptoms which taken collectively, or even a greater part of them, essentially and peculiarly characterise a certain series of forms of disease (the exanthematous typhus, the ileo-typhus, the icteroid typhus, the recurrent fever, and the oriental plague), so that these are seen to be in a certain degree belonging to one another, or, as it is said, related, and requiring to be brought together under a general expression. Then, with reference to the symptom characteristic of all the forms, the typhomania, they have been designated as "typhus," or as the group of typhous diseases. If now we consider the series of characteristic phenomena occurring in the course of epidemic meningitis, we miss, with the single exception of the irregular and uncertain appearance of a variable exanthem, every one of the phenomena peculiar to typhus. No careful observer could confound the cerebral symptoms of meningitis with typhomania, nor could he discover in meningitis any typical course, or distinguish any definite stages; so that there cannot be the most remote suggestion of any rhythmical progress of the disease. As little is there any trace of the peculiar and constant elevation of temperature of typhus; and although in meningitis we here and there may find, in the course of the disease, or *post mortem*, some enlargement of the spleen, or in isolated cases some morbid development of the intestinal follicles, such cases, at least as far as my experience, above set forth, teaches, are only exceptional, and it remains doubtful whether these anatomical changes stand in any relation whatever to the meningitis. I am therefore led to conclude that *there is scarcely any infectious disease with a less title to be enumerated among the typhous forms, than epidemic cerebro-spinal meningitis.*

I am led to a similar conclusion with regard to the relation that is in some quarters presumed to exist between meningitis and malarious diseases; and I must explain the grounds of my conviction, because many of my already reported observations may seem to lend some support to the presumption. As already remarked, there can be no question that the course of epidemic meningitis, both in its fully developed and in its abortive forms—at least in the epidemie

observed by me—not uncommonly presents a clearly marked remittent, or even intermittent character. To this alone may the whole and sole resemblance between meningitis and malarious disease be reduced. One may fairly doubt the propriety of putting together the two forms of disease without further evidence of their identity, especially when reflecting, first, that other morbid processes, which we should not even be remotely inclined to consider malarious, sometimes for a period display an intermittent course; and next, that epidemic meningitis, certainly in the epidemic that I observed, arose and proceeded under conditions which directly exclude the assumption of its malarious nature. We find :—

I. That the epidemic prevailed extensively, intensely, and in the greatest violence, upon a dry, sandy, elevated plateau, that was free from the common sources of malaria (damp or marshy soil), and free also from any endemic prevalence of ordinary malarious diseases.

II. That the commencement and the acme of the epidemic occurred at a season (winter) and in a state of climate (intense cold) which notoriously exclude the prevalence of malarious diseases, even in places where they are endemic; and that, as a matter of fact, on the low levels with marshy soil, as in the Dantzic and Elbing circles, where such diseases occur, they were not observed during the time of the epidemic, nor in the neighbouring localities which the epidemic spared.

III. That persons at that period of life, namely the age of childhood from one to five years, which *cæteris paribus* is the least liable to malarious disease, furnished by far the largest contingent of those attacked and swept away by meningitis. The classes more advanced in life, on the contrary, who suffer first when malarious diseases are prevalent, were in a remarkable degree spared by the epidemic under consideration.

IV. That, lastly, the almost infallible test for malarious diseases, quinine, by the inutility of its employment in those cases of meningitis (as next to be mentioned) in which the malady assumed an intermittent or a remittent character, clearly showed the non-malarious nature of the affection, and the untenable character of the assumption, already refuted, that such cases were examples of a combination of epidemic meningitis with malarious fever, or at least of meningitis in some peculiar way modified by malarious influences.

TREATMENT OF THE DISEASE.

In adding to my report upon the epidemic of cerebro spinal meningitis, in the localities of the government province of Dantzic that I visited, some remarks upon the treatment, it is self evident that I cannot give the results of such exact observation and inquiry as would only be attainable in a clinical institution, and with a comparatively large amount of material. I only intend to convey herein some general impressions that I have received from the cases I have observed, and the practical results communicated to me by the physicians of the several localities.

Nearly all practitioners, especially in the beginning of the epidemic, proceeded upon the assumption that in the treatment of epidemic meningitis they had to combat an essentially inflammatory process, and that the cure of the patient is to be sought by the employment of a more or less active antiphlogistic method. The results have, I believe, decided otherwise; and I speak not only my own opinion, but also that communicated to me by a majority of observers, in saying that a *moderately energetic antiphlogistic treatment has proved itself not to be salutary.* This applies certainly to *general bleeding*, and not less, as it seems to me, to comparatively free *local bleeding* by leeches in the case of children, which, in some of the cases that I saw, was very quickly followed by general collapse; and in others, chiefly of a rapid kind, failed to exert any influence upon the course of the disease, or produced (apparently) a very temporary amendment. It remained a question whether such amendment was really a consequence of the free depletion; since similar phenomena were observed in some cases in which, on account of very pronounced symptoms of cerebral irritability, either small bleedings only were performed, or bleeding was altogether omitted.

It certainly appears that the careful—in young children the very careful—employment of local depletion by leeches, or in young persons or adults by cupping along the spine, is justifiable under the above-mentioned conditions, and not injurious, even if it be denied to be the occasion of the subsequent amendment, or of the favourable course of the disease. It is well known that a very large number of the so-called abortive cases of meningitis were ushered in by extremely severe symptoms, and yet, under rather indifferent treatment, within a few days terminated in recovery. In considering the question of depletion, I believe we

should never leave out of sight that we have not to deal with an inflammatory disease *καὶ ἐξοχην*, but with the local phenomena of an infectious disease, one of the peculiarities of which is, that its local processes are developed with very great rapidity, and that in the shortest time a consistent exudation is formed and undergoes rapid purulent degeneration; and that, either in consequence of the primary infection, or in consequence of the local disorder, the symptoms of irritation, in well marked cases, pass with great rapidity into a stage of depression and collapse.

Next to the abstraction of blood must be considered the local application of cold, chiefly by iced compresses, or by bladders of ice to the head, which were very frequently employed. I believe, from the observations of a large number of practitioners, as well as from what I saw myself, that this agent has been proved to be a most valuable sedative.

I myself, as well as many others, have employed opiates, especially morphia, in states of great irritation, restlessness, extreme hyperæsthesia, sleeplessness, acute delirium, and so forth. In many such cases good results have followed; and there seems to be no question that such *means deserve a far more extensive application in the treatment of epidemic meningitis than they have hitherto generally received.* I am disposed to think that further observations would probably lead to the result *that narcotics, and especially opium, carefully administered, would furnish the best antiphlogistics in the disease under consideration.*

With regard to the value of the very favourite medicine, calomel, I am not able to decide. About its use as an alterative very contradictory results are reported, and as a laxative its use appears to me to be very objectionable. In the employment of evacuants in this disease, the practitioner should aim, I think, not only at the removal of the obstinate constipation, but also at the establishment of a salutary derivation, and should do this by much more effectual means than the tardy and uncertain purgative action of calomel. I do not only infer this *à priori*, but as the result of many observations made during our epidemic, in cases where, after the futile administration of calomel for twenty-four hours or longer, the practitioner was obliged to employ other purgatives.

With the appearance of symptoms of depression the application of stimulants is required. Under such circumstances many physicians have obtained good results by the

administration of musk, and by the application of vesicants to the neck.

A few physicians have given iodide of potassium, both as an alterative at the beginning, and to promote absorption at a later period. Others have used bromide of potassium on account of its anæsthetic action, but whether with any result I am not quite clear.

Lastly, with regard to the use of quinine, in cases of an intermittent character, I have to observe that, according to the judgment of almost all observers, it has been entirely without effect, whether given during the premonitory stage, during the actual course of the disease, or during the often long continued intermittent stage of reconvalescence, and whether in large or in small doses. Moreover, in those abortive cases which presented the character of an intermittent neuralgia, quinine was frequently administered, and was always found to be completely ineffectual.

ON THE STATE OF DISEASE IN SWEDEN DURING THE YEARS 1862-1863.

By WILLIAM DANIEL MOORE, M.D., Dub., M.R.I.A., Honorary Fellow of the Swedish Society of Physicians, of the Norwegian Medical Society, and of the Royal Medical Society of Copenhagen.

[*Read July 3rd*, 1865.]

ABSTRACT.

In an epidemiological point of view the chief characteristic of the years 1862 and 1863 in Sweden, was the wide prevalence of measles. The disease began to augment in quantity in 1861. The following year (1862) it became epidemic, and pervaded the whole kingdom. During 1863 the malady declined, so that, after the first six months of the year, it may be considered to have ceased as an epidemic. Whilst the epidemic of measles was diminishing, diphtheria progressively increased, and small-pox began to augment so greatly as to lead to the apprehension of an epidemic extension of the disease. The weather and temperature of the two years was remarkably unlike.

During the year 1862 there was an uniform persistent winter, a particularly warm spring, a cool and rainy summer and autumn, while the following year presented an unusually mild winter with very little snow, with uncovered fields, and almost uninterrupted open seas, followed by a rather cool spring and moderately warm but rainy summer, during which, in the midst of the month of July, occurred severe frost, simultaneously observed over the whole kingdom, from Norrbotten to Scania. The autumn, however, continued mild to the close of the year, with frequent storms and much rain. The mean temperature, which during the preceding year was, at the Stockholm Observatory, 40·06° F., in 1863 rose to 45·41° F., the same for the six autumn and winter months being 36·78° F. (in 1862, 29·03° F.), and for the six spring and summer months 53·65° F. (in 1862, 51·13° F.) or calculating each season separately, during winter 34·37° F.; during spring (April and May) 44·06° F.; during summer (June—September)

58·46° F.; and during autumn 36·62° F. The unusually high mean temperature of 1863 is therefore to be ascribed less to any excessive warmth during the fine time of the year, than to the circumstance that both the autumn and winter were unusually mild, which may also explain the fact that dysentery and ague, both which diseases might reasonably have been expected to increase considerably both in frequency and extent during a year with so high a mean temperature as that now in question, nevertheless continued so little prevalent.

ADDRESS ON THE OPENING OF THE SESSION, 1865-66.

By GAVIN MILROY, M.D., PRESIDENT.

[*Read November 6th*, 1865.]

SINCE our last meeting at the beginning of July, so many interesting epidemiological occurrences have taken place, both in this country and on the continent, that perhaps I cannot better fulfil my duty on this occasion than to invite your attention for a short time to a notice of the more important of these events. Such a notice at the present time must of course be very imperfect and fragmentary in its details, and as it may be that we are now only on the threshold of far more wide-spreading and more serious epidemic phenomena than have yet fallen out during the last five months, it clearly behoves us rather to watch and consider the occurrences as they present themselves, carefully noting them, and comparing them with the records of the past, than prematurely to seek to draw any inferences, or to venture upon any conclusions respecting them.

And, first, of the cattle disease, which has occasioned such general panic over the country, and has already caused such serious losses in many districts; not that I have anything to communicate about it; for, like most present I presume, I am practically quite ignorant of the subject, and only anxiously wait for some more reliable and satisfactory information about it than has yet reached the public. The confusion and contradictions that have prevailed ever since the distemper was first heard of among us in last June or July may, however, suggest a few passing considerations as to some of the sources of the errors and embarassments which not unfrequently attend epidemiological and epizootic inquiries. A common cause of confusion on such occasions is the use of an ambiguous nomenclature of the diseases in question. Such terms, for example, as the "cattle-plague" (which is the exactly-literal translation of the German, or rather German-Latin word "rinder-pest"), or the "steppe-murrain," are obviously very vague and indefinite, and

therefore inevitably perplexing, for the simple reason that other epizootics also have been frequently called "cattle-plagues," and that more than one species of "murrain" is confidently stated to be endemic in those steppes of Russia which are alleged to be their only true source or birth-place. The confusion is not a little increased by the circumstance that the second species of "steppe-murrain," which has been described, and which is known as the "carbuncular murrain," has really far more of the characters of the "pest," true plague, or carbuncular typhus, as it occurs in the human subject, than the malady to which the term of "rinder-pest," or "cattle-plague," is sought to be limited. The use of the general or family name of "murrain," like that of "pestilence" among men, and of "blight" in the vegetable world, is of course quite indeterminate in a diagnostic point of view, and serves therefore the more to perplex what is intricate enough in itself. How just is that remark by Locke that "were the imperfections of language, as the instruments of knowledge, more thoroughly weighed, a great many of the controversies that make such a noise in the world would of themselves cease, and the way to knowledge, and to peace, too, lie a great deal opener than it does"! Bacon, too, reminds us that "although we think we govern our words, yet certain it is that words, as a Tartar's bow, do shoot back upon the understanding of the wisest, and mightily entangle and pervert the judgment."

The importance, moreover, of having accurate geographical and chronological information as to the past, as well as the cotemporaneous, history of epizootic diseases, and the evils attending the want of such information, have been strikingly apparent in respect of the present malady. Who can tell us what was the nature of the terrible murrain which prevailed in Egypt for two years, if not for longer, before the recent outbreak of the cholera in that country, and caused the loss of many hundreds of thousands of cattle, camels, and sheep; so that, in some parts of the delta of the Nile the river was actually choked up with their carcases? While the land of the Pharaohs, at the north-east corner of Africa, was being thus smitten, the southern extremity of that continent was being ravaged by the same or by some other form of cattle-plague. Then, too, in various parts of Europe there was, about the very same time, a grievous murrain. We read, for example, that in Italy, "the cattle-disease has carried off many thousands of animals within the last five years. It proved very fatal to horned cattle through-

out the country in 1863. In a very limited area near Rome, out of 8,688 oxen, 3,638 were attacked with what is called "peste Hungarica," and of this number 3,009 died. Buffaloes too were equally subject to it. The disease is very infectious. The disease may now (early part of 1864) be said to have ceased."* Now what is this "peste Hungarica?" Is it the same as the epizootic typhus which was prevailing in Bulgaria and Bessarabia during the present summer; or is it like the epizootic lung disease which is now raging in Lower Austria, and against the extension of which such rigorous measures of exclusion are being enforced in the adjacent provinces? These are but samples of the uncertainty and confusion in which we find ourselves involved at the present moment. We must therefore wait for accurate information on these and other questions, connected with recent epizootics which have been prevailing in this country and on the continent.

Of this one thing we are certain, that, within the last twenty years or so, there has been among the lower animals, as there has strikingly been in the vegetable world, an unusual amount and extension of very destructive diseases over large sections of the globe.

Considering the confusion and discrepancy of opinion which prevailed on all sides respecting the most recent, and apparently the most formidable, of our murrains, it was certainly high time that a commission of competent men, including, as it was needful that it should include, a considerable portion of medical men accustomed to scientific investigations, should be appointed by the government to thoroughly examine into the whole subject. This, as you know, has been done; so that we may now confidently look forward to reliable information as to the characters and history of the present and of other co-existing murrains in this country, as well as abroad.

I would only add that this Society, recognising as it does in its programme paper the importance to epidemiology of having accurate accounts of epizootic maladies, has on more than one occasion invited contributions from our veterinary brethren; but hitherto, I believe, without response. This is to be regretted, as it is only by the co-operation of medical men and of veterinarians that progress will ever be made in attaining to the accurate knowledge of these dis-

* Weld's "Last Winter in Rome". 1865.

eases, while the knowledge thus obtained could not fail to be useful in the successful investigation of human epidemics.

I now pass on to another topic that more immediately and specially belongs to our province—the epidemic of malignant cholera which has been engaging so much the attention of us all for the last few months. All that I shall attempt to do is to make a rapid sketch of its general career, since its first appearance in Alexandria in the early part of May, and to note a few circumstances attending this career, trusting that, in the course of the present session, we shall have the subject brought before our meetings by communications illustrative of its particular history in different places and regions. The outline map on the table will facilitate the following of the geographical details.

[The course of the epidemic from Egypt to different parts of Europe was here described.]

The occurrence of the few and sporadic cases at Southampton and its neighbourhood in the last week of September, and subsequently of the small cluster of cases near Epping about a fortnight later, cannot be otherwise regarded, I think, than as indications that the germs, so to speak, of the pestilence, have already reached this country, and that probably it needs but the concurrence of the favouring conditions of season, of heat, and the other more occult atmospheric qualities to stimulate these poison germs to greater and more widely-diffused activity. No opinion has yet been expressed, I believe, that these scattered cases are other than of indigenous and local development, or that they can be satisfactorily traced to introduction *ab extra*. Still it must be admitted that the circumstance of Southampton, which is in such direct and frequent intercourse with the Mediterranean, being the place where the disease first manifested itself this season in England, reasonably suggests the connection of the occurrence with this inter-communication. But we must await further intelligence before we speculate. It is most desirable that, should unhappily the disease appear among us an epidemic, our brethren everywhere will note with the utmost exactitude the dates of the earliest cases, whether fatal or not, and also the antecedent and concomitant circumstances attending them, quite irrespective of the bearing they may be supposed to have on any doctrine or hypothesis whatever.

I would now, gentlemen, invite your attention to a brief notice of the measures which have been, and are being, adopted throughout the Mediterranean, and in the coun-

tries adjoining to it, for the purpose of averting or excluding the pestilence, and of the results which have hitherto resulted from the use of these measures, known under the general term of Quarantine. To the consideration of this subject, certainly one of the most important appertaining to State Medicine, the present time affords a peculiarly favourable opportunity, as the events relating to it are, as it were, occurring to a great extent before our very eyes.

Upon the earliest intelligence of the appearance of the cholera in Alexandria, but certainly not upon the occurrence of the earliest cases there—for, as upon all former occasions, whether of this or of other pestilences, the enemy has been in the citadel for some time before his presence is recognised or admitted—all the leading ports throughout the Mediterranean at once imposed quarantine restrictions, of greater or less rigour and duration, upon every arrival by sea from Alexandria.

[Various details respecting the measures adopted in different countries were given.]

In no countries are quarantine restrictions carried out, in the present day, with greater vigilance and strictness than in Spain and Portugal. Their practice may therefore be fairly regarded as affording one of the best tests of the efficacy of these restrictions, in their rigorous entirety, as a reliable means of defence and protection in seasons of danger. Not only was a strict maritime quarantine enforced at all the Spanish seaports, but a sanitary cordon was established across the neutral ground at Gibraltar, so as to cut off all direct intercourse with the Rock. The same thing was done in 1853, as well as in previous epidemics, inflicting an immense amount of distress on its own working population in the neighbourhood as well as upon the inhabitants of Gibraltar; and on every occasion with unsuccess, the disease having, in some way or another, always found its way across the barrier. The appearance of the disease during the present year not only in various seaports, but also in several inland towns, and even in Madrid itself in the very centre of the country, may reasonably be supposed to indicate the necessity for some modification of the system which has hitherto so signally failed as a safeguard of the public health.

Whatever interpretation should be given of the immunity from the pestilence hitherto enjoyed, during the present season, by Greece and Sicily, and whether this may be fairly ascribed altogether to the rigorous prophylactic policy pur-

sued, or not, all will admit that it is most desirable that the quarantine system now adopted in Mediterranean ports against the introduction of cholera should be carefully examined into by competent men, who could sift on the spot the whole evidence as to its operation, its effects, and past results, and who might thus be expected to arrive at such practical conclusions as would probably be accepted with respect and deference by most, if not by all, the countries concerned. Much good may be anticipated from the inquiries of such a Congress at Constantinople as that which has recently been proposed by the French government, provided its labours be chiefly devoted—not, as was the case with the International Sanitary Conference held in Paris in 1851, to lengthened oral disquisitions and statements resting not unfrequently on very unsatisfactory evidence, but—to minute personal examination of the localities which have chiefly suffered, and to a diligent scrutiny of all the reliable testimony that can be had from the resident medical men and others who were directly engaged during the prevalence of the disease in their several localities. An excellent example of the mode in which such inquiries may be most profitably conducted was afforded by the Commission on the Oriental Plague, between twenty and thirty years ago, and the result of whose labours is embodied in the admirable report by the Academy of Medicine in Paris published in 1846. Our own country must have of course no ordinary interest in the right settlement of the quarantine question, considering the vast amount of her commerce and intercourse, not only with all ports of the Mediterranean, but with the East generally, from the Red Sea on to China and Japan. And here I would remark that there is probably no single spot in the world, certainly none in the Mediterranean, of which it is more important to have an exact, full, and complete report of its cholera epidemic, — comprising a connected record of all the facts illustrative of its history among the civil population, the troops, the ships of the war on the station, and the merchant vessels visiting the port of Valetta —from its very commencement (or, better still, from just before its commencement) to its final cessation, than the island of Malta. This report should also embrace an authentic narrative of all the measures taken by the authorities with the view of preventing the importation of the disease and of arresting its progress, and of the results of those measures on the advent and spread of the pestilence, and on its virulence and fatality among the inhabitants,

together with some notice of their effects on the internal and economic interests of the labouring classes, and the commercial relations and general welfare of the island. The disastrous consequences which this important colony has, on more than one occasion during the present century, suffered from pestilential visitations, render it a matter of national duty that such an inquiry should be instituted.

I may also venture to say that, if the suggestions made by the Council of this Society, in their recent memorial to the Secretary for Foreign Affairs, with respect to the information which might easily be obtained from British consuls in all foreign countries visited by the disease, be acted upon, much most valuable evidence will be collected which cannot fail to be useful in the elucidation of its history, and in the advancement of sound views how to deal with it most successfully.

The memorial, it is satisfactory to know, has not been without some useful result already; as Earl Russell has directed that all reports relating to cholera from our consuls shall, in future, be handed over to the medical department of the Privy Council, and be kept there for the purpose of ready access to those who may wish to consult them.

Passing from cholera to another foreign pestilence, I have now very briefly to notice the recent occurrence of several cases of yellow fever at Swansea, consequent upon the arrival of an infected vessel from Cuba. Three men had died during the voyage, and one was moribund on arrival. As the full particulars have been ascertained by Dr. Buchanan, under the directions of the Privy Council, we shall ere long be able to compare them with the details of similar cases in other countries, whose more southerly latitude exposes them still more to the risk of infection than Great Britain.

Within the last four years, the attention of the French government has been specially drawn to this subject by the more frequent arrival of vessels in a sickly state from the West Indies than formerly; several of them having had deaths from the fever during the voyage, and some of them with actual cases on board on arrival in French ports. At length, the occurrence of a good many cases of the disease on shore at St. Nazaire, at the mouth of the Loire, in the summer of 1861, consequent upon the arrival of an infected vessel from Cuba, excited great alarm in the public mind. My limits will not allow me to enter into particulars. I

will therefore only say that the elaborate inquiry into all the circumstances of the case by Dr. Melier, the head of the Maritime Sanitary Department of France, together with the successful results of the practice which he carried out in respect of the infected vessels, etc.—a full account of which is given in the *Memoirs* of the Imperial Academy of Medicine for 1863—led to the adoption by the French government of important modifications in the quarantine system hitherto pursued towards vessels infected with, or suspected of, yellow fever.

It would be out of place now to give a minute account of these modifications, and of the grounds on which they are based. Suffice it to say that the conclusions which Dr. Melier formed from the consideration of all the occurrences at St. Nazaire, and from a careful review of the history of similar events in some of the ports of Spain, coincide in most respects very nearly with those of the Committee of the Association for the Promotion of Social Science, of which Committee many of the members of this Society took an active part, and which are set forth in detail in their report that was printed by order of the House of Commons in 1861.

The recent events at Swansea, coupled with the notable case of the introduction of typhus fever into Liverpool four years ago by an Egyptian frigate arriving in that port, seem very pointedly to indicate the necessity there is for an examination of the existing hygienic arrangements in our principal ports, with the special view of rendering these arrangements subservient to the protection of the public health, and to the sanitary improvement of our merchant vessels, without unnecessarily interfering with commerce or international intercourse. It is to be remembered that, immediately on the intelligence of the sickness at Swansea, rigorous and lengthened restrictions were at once put upon all arrivals from that port, and also from the neighbouring port of Cardiff, in the harbours of most of the continental countries, to the serious interruption of the trade of these ports; thus showing that we cannot, in this matter, act altogether independently of the views of other nations without suffering detriment to ourselves in more ways than one.

It will thus be seen, Gentlemen, that there are subjects of great public interest awaiting careful consideration at our meetings during the present session.

ON AN EPIDEMIC OF CEREBRO-SPINAL MENINGITIS AT ROCHESTER,

WITH INTRODUCTORY REMARKS ON OTHER EPIDEMICS THAT PRECEDED IT.

By FREDERICK JAMES BROWN, M.D.

[*Read December 4th*, 1865.]

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1. CEREBRO-SPINAL meningitis occurred in Ireland in the years 1846 and 1850.

I was at Haslar Hospital in 1846 and witnessed a death by an acute spinal cord affection of three days' duration. The chief symptom was violent pains in one side of the abdomen, followed ultimately by spasms of the extremities. On dissection, slight serous effusion was found, with large red vessels in the dorsal (lower) portions of the spinal cord. About the same time a man died in the hospital of acute chorea. I was at Rochester in the year 1850. Three cases of what I then termed spinal neuro-meningitis occurred in adults at Rochester and in its neighbourhood, in the month of February. Two of these cases were fatal; one of them in sixty hours. The cases were as follows:—

1. Mrs. Osenton, aged 32, a grocer's wife, attacked the 2nd of February, died the 5th of February. No dissection. The prominent symptoms were violent pains in right hip, causing screaming; rigors; rapid pulse; corrugated brow; contracted pupils; delirium; scanty urine.

Treatment. Bleeding to 10 ozs. Calomel and opium.

2. Mrs. Wood, aged 33, a professed cook, attacked on the 23rd of February with vomiting and purging. Convalescent on the 22nd of March. Prominent symptoms, violent pain in right side; twitchings of muscles; spinal tenderness; numbness; breathlessness; perspiration; scanty, phosphatic urine, not albuminous; pupils natural; hot iron-wire sensation along the spine, extending half way up; frontal headache; vertigo; cramped up decubitus; pulse 116; creamy tongue; retching. During the course of the complaint, repeated remissions and exacerbations took place, in which there

were twitching pains in the legs and heels, and catching respiration.

Treatment. Bleeding to 32 ozs. Repeated leechings, which always afforded relief; blisterings, which were beneficial so long as there was a discharging surface; calomel and opium; aconite; purgative draughts; croton-oil; ammonio sulphate of copper. This woman has had inflammatory spinal cord attacks on two occasions since the year 1850.

3. An adult died in much the same way in which Mrs. Osenton died, but was not seen by me.

II. Rochester and Chatham suffered from no unusual epidemic during the summer of 1864 until the middle of August, when, on the fifteenth of that month, relapsing typhoid fever appeared. This fever raged throughout September and disappeared late in October. Continuous typhoid fever was seen during the same period, but the cases were few. The relapsing form of fever presented the following types of relapse, viz., 5th or 6th day, 7th, 8th, or 9th; 32nd, viz., crisis in twenty-eight days and relapse four days after, lasting fourteen days. Convalescence was usually prolonged. One perforation case died on the ninth day, during a relapse. Two cases of intestinal hæmorrhage recovered.

Treatment. Sulphuric acid. Ammonia (which agrees well with patients under continuous typhoid fever) caused retching. The deaths only slightly exceeded those of continuous typhoid fever such as it usually appears in these towns, averaging 5 per cent. of the seizures.

Aphthous affections appeared about the same time as the relapsing typhoid fever, and have continued ever since. The part of the body first affected was sometimes the anus or the vulva; at other times the mouth or throat. An aphthous condition was observed in some of the relapsing typhoid cases, and a parturient woman died eighty days after childbirth from what might be termed aphthous metria.

True typhus is extremely rare in these towns. I attribute the immunity of Rochester and Chatham from typhus to the absence of overcrowding and of destitution; whilst bad drainage renders typhoid fever more or less a permanent guest. Typhus first appeared, after an absence of many years, on the 10th of December, 1864. A few cases occurred through that month, and then the fever disappeared. Synocha and intermittent fever occurred during September and October in 1864.

An epidemic of hooping-cough, that presented the characteristics of laryngismus rather than of pertussis, com-

menced on the 8th of December, 1864, and continued through December into January, 1865. I lost two cases, and there were other fatal cases in the towns. Tartar emetic appeared to be a specific for it, no cases dying that were treated solely by this medicine. One case (a child of mine, 2⅓ years) was dissected. Appearances, double pneumonia of lower margins and cerebral hyperæmia.

Three cases of that unusual epidemic, acute colitis, occurred as follows:—

1. One on the 14th of June, 1865, dying in nineteen hours. This was a boy aged 9 years.

2. One on the 23rd of June, 1865, dying in twenty-one and a half hours (the child of my brother, John D. Brown, M.D., aged 2⅓ years). This boy was dissected. Appearances: transverse and descending colon violently inflamed, brain hyperæmic.

3. One child, soon after, the 23rd of June, dying within twenty-four hours of the attack. Other cases proved fatal in from four to fourteen days. As regards treatment, leeching the anus repeatedly was efficacious in all the cases submitted to this method.

Two cases of idiopathic tetanus have occurred, viz.,—

1. Alfred Sage, aged 27, attacked the 25th of March, admitted into St. Bartholomew's Hospital at Rochester on the 28th of March; died the 29th of March. [See *British Medical Journal*, vol. ii for 1865, p. 497, for report of the case.]

2. James Sweetlove, aged 59, attacked by trismus on the 17th of July; by opisthotonos on the 21st; died on the 30th of July. Attack induced by sleeping in the night air during drunkenness.

III. Cerebro-spinal disorder has appeared in Rochester under two forms, viz.,—

1. Cerebello-spinal neuro-myalgia, and,

2. Cerebro-spinal meningitis.

The neuro-myalgia has presented two varieties differing in degree of severity, viz., (*a*) Cases marked principally by the occurrence of vertigo and nuchal stiffness; (*b*) Cases manifesting severe pains generally throughout the body and extremities, and accompanied by vomiting, in addition to nuchal pains and stiffness, and a few head symptoms. The inflammatory form of the disease has been witnessed in only one case.

In my report to the Privy Council,* dated October 15,

* Eighth Report of Medical Officer of Privy Council, p. 301.

I mentioned a fatal case that had occurred in May. Further inquiry shows that this was a special case of cerebro-spinal disease occurring in April 1864, not in the year 1865. Trusting to memory, instead of reference to written records, occasioned this error in the date. I do not now include this case in the list of epidemic seizures, but I will narrate a few particulars concerning it.

Case.—Robert Wilson Drake, aged 12, residing on a hill at Chatham, died under the care of Mr. Steddy, on the 19th of April, 1864, after an illness of three weeks. This lad had attended a review of the volunteers on Chatham Lines, and had been seized whilst on the grounds with extraordinary cerebral and spinal symptoms. It was said that the firing of a gun frightened him. He died of opisthotonos, but this was not a case of mere tetanus, for the brain was complicated. The lad lay in a state of coma-vigil, twitching all over on being touched. This case was either one wholly unconnected with the epidemic, or it was a single one preceding by more than a year the present manifestation of the disease. The first case in 1865 that attracted my attention was that of Agnes Gray, admitted to St. Bartholomew's Hospital at Rochester on the 25th of May, but attacked on the 18th of May.

Since my attention has been directed to the epidemic, I have referred to notes and registers, and I find that the first vertigo case occurred on the 11th of May, in the person of Henry Wright, aged 53, an out-patient of the hospital; and on the same day in Annie Smilie, aged 33, also an out-patient. On the 25th of May, Edward Mott, aged 29, was admitted an out-patient, and Agnes Gray (referred to above), was admitted an in-patient. Vertigo cases have occurred in the practice of the following medical practitioners throughout the summer and autumn, but they were not recognised as manifestations of the epidemic at the time of their occurrence.

List of Practitioners.—Frederick Page Atkinson, M.B., House-Surgeon, or rather Resident-Surgeon, in charge of patients at St. Bartholomew's Hospital; John Dan Brown, M.D.; Frederick James Brown, M.D.; Higginson Fayle, Esq.; Edward A. Steddy, Esq.; Herman H. Tribe, Esq. The treatment of the vertigo cases was as follows:—

Stimulants by Mr. Tribe; antiphlogistics by the other practitioners. None of the cases proved fatal. My brother's treatment was leeching, blistering, aconite, iodide of potassium, salines, and camphor. My treatment consisted

of blistering and the use of sulphate of zinc, with sulphuric and phosphoric acids. Persistence of vertigo and of headache marked most of these cases whatever might be the treatment employed. The single case exhibiting the inflammatory form of the disease occurred on the 30th of September, and died on the 11th of October, in the practice of Dr. John D. Brown.

Cases of cerebello-spinal neuro-myalgia [(*b*) variety].

1. Agnes Gray, aged 32, widow, domestic servant, residing at Brompton, which is a hilly situation near Chatham, was admitted to the hospital on the 25th of May. Attacked with rigors on the 18th of May, but had premonitory symptoms, simulating rheumatic pains, two weeks before the seizure. Discharged cured on the 21st of June. Prominent symptoms: pulse 100, weak and intermitting; respirations 32, variable, sometimes emphatic; countenance dusky red, without expression; intermittent strabismus; left pupil dilated; deafness; tongue nearly clean, protruded with a jerk and lateralised on protrusion; no swelling of abdomen; bright rose-coloured spots; subsultus; clonic convulsions upon touching the abdomen; præcordial pains; chattering of the teeth; delirium; slight amount of vomiting; no diarrhœa.

Treatment. Turpentine, iodide of potassium, wine, blistering the nucha. This case has been reported to the Privy Council by Dr. Atkinson.

2. C. White, aged 63, widow, accident nurse to St. Bartholomew's Hospital, was seized with rigors and vomiting on the 17th of July. She had been suffering severe pains from the 11th of July, and from slight pains regarded as rheumatic for three weeks previously to that date, viz., from the 20th June. She had had no communication with Agnes Gray. She was discharged cured on the 6th of September, but she still suffers from neuralgia.

On the 18th of July the vomiting ceased, but nuchal and right hypochondriac pains seized her. The pulse was weak and irregular; the tongue dry and furred; and there was delirium and sleeplessness, with general neuro-myalgia.

On the 20th there was violent pain leading from the præcordia to the spine, interrupting respiration, for which the patient was bled to a few ounces with relief.

On the 22nd there was only strangeness of manner in lieu of delirium, sleep having been obtained for the first time on the preceding night by the use of Dover's powder. The pulse was peculiar on the evening of the 21st before sleep was obtained: it was bounding and of various rhythm,

beating 1, 2, then 3, rapidly on to 6 or 7; then following some other rhythm. After sleep the pulse was regular. The tongue was nearly clean. There was great pain in the nucha, also in the limbs and in the abdomen, but no appreciable swelling except of the abdomen to a slight degree. There was one loose motion. A brownish-red rash covered the trunk, looking like the rash, either of typhus or of secondary syphilis. The patient continued to suffer from violent pains in the neck, abdomen, and limbs for many weeks, but the pyrexia ceased on the 24th of July, eighth day, without running the course of febris. There were numerous remissions and exacerbations during the illness, rendering it improbable that the case was one of typhus terminating in one week. The treatment consisted of one small bleeding, and repeated leechings and blisterings, which invariably afforded relief; also of aconite, iodide of potassium and Dover's powder, with occasional purgatives. This case has been reported to the Privy Council by the house-surgeon.

3. Thomas Briggs, aged 37, residing in a low-lying part of Rochester, and employed at the gas works, was attended by Dr. John D. Brown. He was declining in health from the 18th of July, but was attacked with rigors on the 15th of August. With the rigors there was violent pain in the head, also in the shoulders, and severe sickness commenced and lasted for an entire week. The prominent symptoms were vertigo and pain in the head, which persisted throughout the illness.

On the 3rd of October he was seized with epileptiform fits, and had five in the period of twenty hours. The fits were succeeded by numbness of the left side, and by double vision. He recovered under the use of zinc with sulphuric and phosphoric acids, and pustulation of the scalp by croton-oil. The previous treatment appeared to be injurious, viz., leeching, iodide of potassium and salines, afterwards bichloride of mercury; quinine had also proved injurious. He was convalescent on the 19th of October, but his vision was misty and his memory impaired. He was free from deafness and from pains, and was able to walk about. This man once resided in Romney Marsh, which circumstance led the medical attendant to regard the case as some obscure intermittent form of fever until its true nature revealed itself.

4. Charlotte Card, aged about 20, a domestic servant residing in a hilly situation in Rochester, was attended by Dr. John D. Brown. She was attacked on the 17th of

September, with rigors and vomiting. On the 18th, severe pains seized her in the head, trunk, and extremities, reaching to the tips of the fingers, and there were nuchal pains and stiffness. The vomiting was violent for three days. This patient recovered in eight or ten days without keeping her bed. The treatment consisted of leeching the spine, blistering, aconite, iodide of potassium, salines, and camphor. Well marked relief was afforded by the leeching. I have been unable to ascertain what amount of pyrexia was present in this case, but it will be seen by the following instance that a patient can keep out of bed for many days under this disease.

Case of Cerebro-Spinal Meningitis.—Elizabeth Jennings, aged 38, the wife of an artisan residing in a low-lying locality in Rochester, was attended by Dr. John D. Brown. She had inflammation of the brain when a girl, but she had quite recovered from its effects. I may mention, however, that the skull was found after death to be extremely dense and thick. This patient was exposed to foggy evening air in a hop-garden, on Monday, the 25th of September. She felt that she had taken cold.

On Saturday, the 30th of September, was taken with rigors and pains throughout the entire body. She was first seen by Dr. John D. Brown, on Tuesday, the 3rd of October, when there was rigidity of the neck and other symptoms recognised by him as being spinal. On the 6th she was seen by me; she was sitting on a sofa curled up on one side and perfectly rigid in the neck, which was twisted. On the 7th she took to her bed. On the 9th she was seized with brain symptoms, viz., violent vomiting and headache, and delirium. On the 10th her decubitus was on the left side, diagonally across the bed, with outstretched arms. The forearms were rigid and semi-flexed, and were occasionally jerked. There was delirium, but the patient could put the tongue out a short distance on being desired to shew it. The pupils were dilated and immovable. The rectum and bladder were paralysed, that is to say, motions (extremely offensive) escaped in the bed; whilst the urine distended the bladder, necessitating catheterism. The pulse was 110-120, and feeble. The tongue was red and creamy; there were no spots on the skin. She died on Wednesday, the 11th of October, at 7 A.M.

The treatment consisted of leechings and blisterings, shaving the head with cold water applications, small doses of tartar emetic, aconite, iodide of potassium, and salines; also

calomel in repeated doses. Turpentine was given her on the 10th. *Post-mortem* examination thirty-six hours after death. The odour on opening the body made me retch, which is most unusual for me.

Head. Skull very dense and thick; meninges red, with vessels distended. On cutting the tentorium a large quantity of sero-purulent fluid escaped and continued to flow from the spinal canal. There was a quantity of the same fluid in the lateral ventricles with lymph masses lying loose. The right corpus striatum was softened just below the surface, forming a lid to this organ. The parts in the centre of the brain, from the corpus callosum to the base, right through, were so lacerable as to give way on the least traction. There was lymph on the base of the brain, and the cerebellum was extremely lacerable and of a red colour, approaching to violet. I have never seen the cerebellum either softened or coloured as it was in this case. Thorax not opened.

Abdomen. Liver when sliced presented a red lead colour, which yielded pulp on being scraped with the scalpel. Spleen turgid. Kidneys of an intense violet red colour, with blood oozing from the cut surface, crisp and emphysematous to the feel, and lacerable. Intestines injected in a small portion of the ileum, but there was no enlargement or ulceration of the glands of Peyer, or of the mesenteric glands. The death certificate was as follows: cerebro-spinal meningitis, eleven days.

It is clear that in this case the incubative stage lasted from Monday evening, the 25th of September, to Saturday, the 30th of September—five days; that the neuro-myalgic stage lasted from Saturday, the 30th of September, to Monday, 9th of October—nine days; and that the meningitis lasted from Monday, the 9th of October, to Wednesday, the 11th of October—forty-eight hours.

In concluding this paper I beg to state that a girl, aged 14 (Margaret Gee), is now in the hospital, suffering from cerebro-spinal complication under typhoid fever. She was admitted on the 26th of September, but was complaining for three weeks previously. She was delirious and curled up on one side on admission, and has never ceased to utter complaints of pain in the back.

There are numerous instances in the towns, at the present time, of persons suffering from vertigo by itself, or with stiffness and pains in various parts of the body, evincing a wide spread disposition to cerebro-spinal disorder.

ON THE EPIDEMIOLOGY OF CAPE COLONY AND NATAL IN 1864.

By Deputy Inspector-General R. LAWSON, M.D.

[*Read December 4th*, 1865.]

ABSTRACT.

As in 1863, no epidemic of a general and severe character appeared in the Command, though indications of epidemic influence were met with at various points.

In April, fever of a typhoid character was very common among the Boers to the northward of Queenstown in the Cape Colony. In October, 1864, the civil population in D'Urban again became subject to dysentery and diarrhœa. This went on increasing through November to December, and spread with low fever among the natives along the coast to a very unusual extent, causing much mortality in the locations in the valleys of the Umoti and Tugela. In November diarrhœa was common also at Maritzburg, and in December fever was added. The epidemic among the Kaffirs was attributed to the insufficiency and bad quality of their usual food—the maize, but the prevalence of a similar affection among the whites at D'Urban and Maritzburg, who did not live on maize, shows the operation of another and separate influence. These diseases began to diminish among both classes in February, and soon after nearly disappeared.

On the 9th of September, 1864, a woman of the 96th regiment, quartered at the Cape Corps barracks, at Graham's Town, had an attack of cholera, attended with a considerable degree of collapse. There was no other case met with at this time, or before February following, when several cases were met with among the civil population in Cape Town.

In December a case of varicella occurred in a soldier at Port Elizabeth, and about the same time this disease was met with in a good number of instances in Graham's Town in civil life.

In April, 1864, conjunctivitis was common among the

civil population in Maritzburg; the following month the same disease was observed around Winvogelberg. There was a slight increase in the admissions among the troops about the same time, but not greater than has occurred on some other occasions during the year, without any similar prevalence among the population at large having been reported.

In February there was a considerable amount of pleuropneumonia among horses near Graham's Town. In January, sheep near Fort Beaufort were subject to a complaint affecting the heart and liver, most probably of an inflammatory nature, and connected with malaria. Sheep in Kaffraria were affected rather generally with brandte-zeikte, or scab, in March.

In the latter end of the year the crops of oats, which in the country are employed for feeding horses, and commonly designated oat-hay, were affected with rust. This was met with very generally over the country, from the coast to the Orange river, and something similar seems to have occurred at Natal, and to have implicated the maize, the common food of the natives there as well. Both species are usually exempt from rust in this country and Natal.

ON THE LAWS OF PESTILENCE.

By Dr. ALEXANDER HAMILTON HOWE.

[*Read December 4th*, 1865.]

ABSTRACT.

1. EPIDEMIC visitations recur at regular intervals of time, of which eighteen and a-half years may be taken as the type. This regular and stated interval is liable to a little variation both on the one side and the other; but a period varying from seventeen to twenty years will embrace all possible deviations.

2. The length of the interval between successive periodic visitations of epidemic diseases corresponds with the period of a single revolution of the line of the lunar nodes, and a double revolution of the lunar apse line.

3. The revolution of the lunar node and apse line involving a material difference of relation, or rather relative position, of the moon to the earth's equator, must exercise a very sensible influence on the tenuity of the earth's atmosphere.

4. It is considered that the difference of tenuity must render the atmosphere at certain times more susceptible to the propagation, if not also to the origination, of the epidemic poison.

5. The influence of the revolution of the lunar node and apse line upon the physical condition of the earth's atmosphere has never yet been demonstrated by astronomers and meteorologists, although there can be no doubt whatever of its existence. M. Arago considers that its effects will be quite the opposite to that of gravity.

6. This influence is more visible by its indirect than its direct effects; by its medical than by its physical consequences; in the same way as the cause of the secular acceleration of the moon was discovered by the indirect effect produced upon the earth's radius by the planetary masses.

7. A double revolution of the lunar apse line and a single revolution of the lunar node, occupy very nearly the same period of time, namely eighteen and a-half years; so that,

at the expiration of that period, the lunar mass occupies exactly the same relative position to the earth's equator which it did at the commencement of it.

8. The revolution of the lunar node causes a difference in the moon's declination of no less a quantity than thirty degrees and thirty minutes during the period of eighteen years and a-half.

9. But since the earth's equator is inclined twenty-three degrees and thirty minutes to the ecliptic, and since the moon's orbit is also inclined five degrees thirty minutes to the ecliptic, the moon's orbit must, in certain positions of her nodes, be inclined about twenty-nine degrees to the earth's equator, and in other positions eighteen degrees, and during eighteen years, the time in which her nodes perform a complete revolution, the plane of her orbit will have every possible position between eighteen and twenty-nine degrees (*Ferguson*).

10. In epidemic visitations depending upon lunar influence (for there are other sources of epidemic diseases, local and partial), the longitude of the lunar node is always a small number, understanding by a small number anything under one hundred and eighty degrees, or six signs of the zodiac.

11. Epidemic visitations possess regular periods of invasion, increment, acmè, and decline.

12. This would proceed from whatever cause they may originate; but the regularity of the progressive increase appears to me to agree better with an exact physical than with a variable moral or social cause.

13. The simultaneous appearances of epidemic disease in several places of the earth's surface, its continuous and progressive march in a somewhat straightforward direction, shew that it owes its origin to cosmical, and not to local, causes.

14. The simultaneous appearance of epidemic and epizootic diseases, referred to by authors on the subject of epidemic diseases, likewise prove the existence of some great cosmical cause, as distinguished from the more ordinary sources of diseases, namely contagion, malaria, the influence of heat and cold, and all other such causes of disease.

15. The simultaneous outbreak of an epizootic and an epidemic is well illustrated by the present epidemic visitation of 1865.

16. It is considered that the influence exercised by the moon on the earth's atmosphere will extend as far as thirty degrees beyond her own actual declination; that is to say,

to sixty degrees north and south of the equator, and these are what may be styled *epidemic limits.*

17. This cause will operate most powerfully within the compass of the moon's actual limits in the heavens north and south of the equator; that is to say, that the moon's influence in producing a state of the atmosphere most favourable to the propagation of epidemic disease, will operate most powerfully within a space of the earth's surface comprised between thirty degrees north, and thirty degrees south of the equator.

18. Accordingly we uniformly find that epidemic diseases originate within the limits last referred to.

19. It is a most important point to remember that it is only a limited number of the whole community which is liable to the malignant and deleterious influence of the epidemic poison, or loimaitia.

20. The period intervening between two successive visitations of epidemic disease may be called the *epidemic intervals;* the duration of the epidemic visitation may be called the *epidemic phase;* the material cause of the visitation the *epidemic poison, or loimaitia;* and the basin of the Mediterranean *the epidemic focus.*

21. Epidemic visitations will always travel in a northerly direction, and follow the course of the lunar node northwards.

22. Each century has its own peculiar typical and invariable epidemic.

ON PROFESSOR PETTENKOFER'S THEORY OF THE MODE OF PROPAGATION OF CHOLERA.

By HERMANN WEBER, M.D., F.R.C.P. Lond., Physician to the German Hospital.

[*Read December 4th*, 1865.]

PROFESSOR MAX PETTENKOFER'S researches on the mode of propagation of cholera are not unknown to the Epidemiological Society; the share which he has taken in the labours of the Royal Bavarian Commission for scientific investigations on the subject of cholera, and in the preparation of their valuable *Report on the Epidemic of Cholera in the Kingdom of Bavaria in* 1854, is generally appreciated, and also his further publications on the mode of propagation of cholera, have been read with great interest, but yet I am not far wrong in saying that his views have hitherto not received in this country that amount of general attention which they deserve.

I shall base my communication principally on Pettenkofer's last paper "On the Mode of Propagation of Cholera," published in the *Journal for Biology* for 1865,* and addressed not only to the medical but also to the educated reader in general.

In discussing the question of communicability, Pettenkofer agrees with those who maintain that cholera is propagated by human intercourse, adopting the words of Griesinger,† that not only patients affected with well-developed cholera, but also patients suffering merely from diarrhœa, and perhaps even healthy persons coming from infected districts, may communicate it to other healthy persons, and thus propagate it; but that, in addition, certain local accessory causes must exist, if an epidemic spreading of the disease is to occur in a certain district. In the sense of the

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* "Ueber die Verbreitungsart der Cholera". Von Max Pettenkofer. Zeitschrift für Biologie. Jahrgang, 1865, pp. 323ss.

† Virchow's "Handbuch der Pathologie und Therapie", vol. ii, part ii. "Infections Krankheiten". By Professor Griesinger. Pp. 242-374. 1857.

old school, cholera is therefore strictly neither a contagious nor a miasmatic disease, but a mixture of both, and to this peculiarity it is probably due, that the propagability of cholera has been contested by so many observers, and is even now not admitted by all.

That a *high temperature* and other *atmospheric conditions*, although not without influence, are not *essential* to the existence of an epidemic of cholera, is shown by the facts mentioned by Hirsch in his excellent chapter on cholera,* and especially by the occurrence of epidemics in Moscow in 1850, with a temperature of the air of 4° F. below zero (—20° cent.), and in the same year in Orenburg, with a temperature of 22° F. below zero (—30° cent.), and in the winters of 1851 at Prague, and of 1852-53 at St. Petersburgh.

That the *elevation* of a locality above the nearest river or lake, which is of great influence in some places, as shown for London by Dr. Farr's† ingenious researches; and for Oxford by Dr. Acland's‡ valuable memoir, is of no importance in some other places, is demonstrated by the fact that at Zürich the higher districts (Fluntern) have suffered much more than those of lower elevation.

The two essential conditions for the propagation of cholera, and for the occurrence of epidemics of this disease, are the *human intercourse* and a *certain nature of the locality*; or, in other words, *the excretions of cholera patients to give the germ*, and *the soil to develope it*.

Pettenkofer admits two ways of infection: 1, *direct*, from the sick to the healthy; and, 2, *indirect*, by the intervention of other agents, the patient yielding only the *germ* to a focus of infection. The *direct infection* (by the *contagion*, according to the old school), he regards as of little importance in cholera; he considers it as rare, and doubts even its occurrence. The facts, that fresh evacuations appear to be innocuous, and that medical men and nurses, as well as people employed in removing the evacuations of cholera patients from drains and cesspools, are not more frequently affected than the rest of the population, are in support of this view. Pettenkofer thinks that the comparatively rare cases of direct infection, by contact with the sick or with their

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* "Handbuch der Historisch-Geographischen Pathologie". By Dr. August Hirsch. Vol. i, p. 131. Erlangen, 1859.

† The Registrar-General's Report on the Mortality of Cholera in 1849.

‡ "Memoir on the Cholera at Oxford in the year 1854". By Henry Wentworth Acland, M.D., etc. London, 1856, p. 49.

evacuations, will some day receive another interpretation; *i.e.*, that they occur by the intervention of something accessory, representing the usual agency of the soil; that they are, in fact, cases of indirect infection. But whether really or only apparently direct, they are of so rare occurrence as to be quite subordinate in the epidemic propagation of the disease. The cholera requires for its spreading, the soil; it "is, in fact, a disease of the soil, quite as much as the malaria fever, from which it differs only by the circumstance that it does not originate in an autochthonous manner, except in India, whence its germ is occasionally propagated to us by the human intercourse." (*l. c.*, p. 330.)

The importance of the *nature of the soil* appears to be placed beyond doubt through the concurrent observations of numerous reporters made at different times, and in different countries, by men holding themselves different theories. Thus the Bavarian Commission found that "all the localities, or parts of localities (in Bavaria), epidemically affected by cholera, were situated on a porous soil, permeable to water and air, and that, as far as known at present, water is reached in all of them at a certain, not very great, depth below the surface (between five and fifty feet)." (*l. c.*, p. 331.) This quality of soil the Commissioners regard as indispensable for the occurrence of an epidemic spreading of cholera, having never met with it in localities situated on rocks impermeable to water, even if isolated cases occurred there.

Pettenkofer, as well as Hirsch, who likewise adopts this view,* refers, in its support, to the older experience of English observers, but ascribes to Boubée† and Fourcault‡ the merit of having first established in 1832 and 1849, as a general rule, that cholera does not develope itself epidemically in localities situated on rocks, especially rocks of primitive formation, while it spreads rapidly in localities built on alluvial and tertiary formations. The French observers have, in almost every instance, confirmed these inferences in the epidemic of 1854. There are some local epidemics on record which appear to form exceptions to this rule, but it would be necessary, before admitting them as such, care-

* Hirsch, loc. cit., p. 138.

† Boubée's first communication to the French Academy was made in July 1832; he confirms the results then obtained in his "Nouvelles observations sur la marche géologique du cholera". Compt. Rendus, vol. xxxix, 1854, p. 627, and p. 794.

‡ Fourcault, "Gaz. Méd. de Paris", 1849.

fully to examine every locality, for even in very elevated situations of districts consisting almost entirely of rock there are not rarely wide fissures filled up with alluvial soil, the inhabitants of which are occasionally visited by typhoid fever and ague, as I have repeatedly had the opportunity of witnessing in Switzerland.

The epidemic occurrence of cholera in the Austrian province of Krain, in a mountainous country, was considered by some observers as opposed to the view just mentioned, but Pettenkofer's personal inspection has shown that the locality affected is not situated on impermeable rock, as had been supposed, but on porous soil, although the greater part of the surrounding district consists of rock. Similar was the experience with regard to the epidemic of Kienberg, situated on an elevation formed by Jura limestone, on the left bank of the Danube; and also with regard to the epidemic of Zurich. Very instructive in this respect is also the fact, that on the heights of Rasderto, near St. Martin, on the road from Laibach to Neustadt, on the Gurk, cholera raged repeatedly with the same violence as in the valleys; in the same region, however, ague is likewise prevalent in spite of the elevation and the rocky aspect; and a more accurate inspection of the locality has manifested the existence of many wide fissures between the rocks filled up with alluvial soil permeable to water.

Besides the porosity and compactness several other conditions of the soil appear to be of great importance, viz., the distance of the *subsoil water*, or "ground water" ("*Grundwasser*") *from the surface, the rising and receding of this subsoil water* (fluctuations of its level), *and the impregnation of the soil with organic substances, especially those derived from animal excretions.* The neighbourhood of water has always been considered as influential in the propagation of cholera, but the water on which our habitations lie, or that nearest to them, is much more important than that of an adjacent river or lake. Yet this point has hitherto not received sufficient attention, and without regular observations, the depths below the surface, the fluctuations, and in general the relations of the "subsoil water" to the surface cannot be ascertained. "It has been proved," Pettenkofer says, "that the level of the subsoil water at a certain locality and a certain period of time, cannot be inferred either from the observation of the local atmospheric deposits, or of the watermarks of the nearest river, but that special observations are necessary at every place, to ascertain the level and

the fluctuations of its subsoil water" (p. 336). The atmospheric deposits are, of course, the ultimate source of subsoil water, but, through local conditions, its position at certain places is considerably influenced. It not only depends on the amount of atmospheric moisture deposited in a certain locality, but also on how much of it descends downwards, how much is retained in the upper stratum, how much evaporates again, how great is the fall of the impermeable stratum on which the ground water stands, how great are the local impediments for its flowing off, and how much may be added by the moisture flowing down from higher places along passages hidden below the surface.

In the average it may be assumed, that under otherwise equal circumstances, those localities suffer more from cholera the surfaces of which lie nearer to the level of the ground water. "The distance of the subsoil water from the surface may in general be regarded as equivalent to the distance of the first impermeable stratum in this soil. We are, therefore, by no means entitled to regard the surface of the subsoil water as horizontal; but it follows exactly the movements of its impermeable substratum." Thus in the comparatively small area which the town of Munich occupies on the plateau of Bavaria the measurements instituted show local deviations of the fall of the subsoil water from the level line, amounting to more than ten feet. "The fall of the impermeable stratum *may* be parallel to the fall of the upper surface, but is not *necessarily* so; it is even the rule that it is *not parallel*, that the one is steeper than the other. If the impermeable stratum has a slight, and the porous stratum a great fall, the greater elevation of the surface will be equivalent to a greater distance from the water (the subsoil water); but if the impermeable soil ascends in an equal angle with the porous surface, then the greater elevation is not associated with a greater distance from the water. From this point of view we must look at the influence of elevation on cholera, and on the applicability or inapplicability of Farr's formula. In London elevation of the surface seems to be connected with a proportional diminution in the moisture of the soil. For Paris the formula is not adapted, and accordingly we learn through the geological and hydrological map of Paris by Delesse, how rapidly there the impermeable stratum and the ground water ascend on both sides of the Seine. The examination of the soil of Vienna by Süss has led to a similar result for that town, where the cholera violently raged in several suburbs situated a couple

of hundred feet above the Danube" (pp. 337, 338). Pettenkofer further adduces in support of his views the epidemic of Zurich, which made its principal ravages in the district of Fluntern at an elevation of about 400 feet above the level of the lake; the examination of the geological condition of Fluntern manifested the existence of the subsoil water at a depth of only ten feet below the surface.

The well-known fact that the same places have been in one epidemic spared, while they were in another attacked, although they had been in both epidemics in communication with infected localities, Pettenkofer ascribes, like others, to a different degree of susceptibility of the same places at different periods; and *the cause of the greater or diminished susceptibility*, he finds *in the different degree of humectation of the soil, and in the varying position* (rising and receding) *of the subsoil water.* He points to the observation repeatedly made, that a great prevalence of ague or malaria fevers often precedes the spreading of cholera in certain localities,* and suggests the probability that the malaria fevers are connected with the presence of stagnant ground water near the surface. Munich, where ague is generally not endemic, was much visited by it in 1853, when the level of the ground water was unusually high.

To the varying degree of humectation of the soil, and not to the direct influence of the high temperature, Pettenkofer attributes also the usual, but not constant, occurrence of the epidemic of cholera in summer. As a rule, but not without exception, he says the ground water recedes from July to December, when it usually remains stationary up to March, to rise again from March till June or July. In the varying degree of moisture he sees also the cause for the different manner in which the villages of the valley of the Würm, near Munich, were attacked in 1836 and 1854, in both of which years the cholera was epidemic in Munich. In 1836 the whole district from Allack to Kreiling became infected; while in 1854, when the communication was much increased through the railway, with Pasing and Planegg as stations; the whole valley remained free, with the exception of the two lowest villages Allack and Untermenzing. No observations with regard to the subsoil water have been made as early as 1836, but in 1853 it rose in Planegg, from June to September, to an unusual height and thus permeated strata of soil which for many years had not been reached by it;

* Hirsch, loc. cit., vol. i, p, 147, and p. 33.

it sank, however, as much as fourteen feet and a-half between September, 1853, and January, 1854. "If the cholera had been imported into the valley of the Würm," Pettenkofer argues, "already in the autumn of 1853, instead of in the summer of 1854, the villages situated upwards between Untermenzing and Kreiling would have, no doubt, again suffered in the same manner as in 1856" (p. 346). As, however, the cholera reached the valley not before the summer of 1854, only Untermenzing and Allach, the two lowest villages in the valley, still exhibited a slight disposition. In the inferior portions of the valleys the fluctuations seem, in the average, to occur later and more slowly than in the upper portions, as was also manifested by the course of the epidemic in the valley of the Paar.

The third quality of the soil necessary to render it a proper nidus for the development of the cholera germ, is the presence of organic substances, especially the impregnation with the organic products of waste of the human economy, and particularly the solid and fluid excretions. These waste products are present not only in towns and villages, but also near the barracks of armies and the tents of labourers and pilgrims. The upper strata of the soil are, in general, more impregnated with these organic substances than the lower; the higher, therefore, the subsoil water ascends, the more impregnated will probably be the layer of the soil which is humectated by it.

The relation existing between the cholera germ imported from without, and the soil forming the nidus for its development, Pettenkofer considers, as yet, as hypothetical, but he regards the *combined action of both as indispensable, for the production of the active cholera poison.* He discusses the possibility of two views, viz., 1, that the cholera germ requires for its farther development and multiplication a certain soil, and infects only after having passed through this process in the soil; or, 2, that the material from the soil, and the cholera germ communicated by the intercourse, act on each other within our organism, undergoing chemical processes, the end of which is the disease in question; the cholera germ, therefore, would be rendered *active,* according to the former hypothesis, *outside;* according to the second, *inside* of our organism. Pettenkofer does not decide for either, but thinks that Snow's researches on the influence of polluted water are in favour of the second. He would give Snow's fact the interpretation that the impure water contained the substance which, under ordinary circumstances,

is communicated by the personal intercourse (the cholera excretions), and the material derived from the soil would have already existed in the air of the houses. As, however, the water was not only drunk, but used also for other household purposes, and had therefore abundant opportunity to come in contact with the soil, the process may also be explained by the first hypothesis. Snow's own explanation, that the water contained the *active poison*, is not acceptable to Pettenkofer, nor does he approve of the view that water forms the general medium of the propagation of the disease, a theory which appears to him in opposition to the facts observed at Munich and other places. To us it seems not unreasonable to suppose that polluted water may contain not only the germ, but also the active poison, for water impregnated with decomposing animal excretions may, we should think, form quite as apt a nidus for the development of the cholera germ into activity as the impregnated soil.

The following five conditions which are regarded as essential for the occurrence of epidemics of cholera, deserve serious consideration in a hygienic point of view:—

1. An inhabited stratum of soil permeable to water and air down to a certain depth (the depth of the subsoil water).

2. A periodic fluctuation in the degree of moisture of this stratum, which in the alluvial soil is manifested in the most simple and unquestionable manner by the varying position of the subsoil water, the period of the receding of the subsoil water from an unusual height marking the period of danger.

3. The presence of organic, especially excrementitious, matter diffused through the susceptible stratum.

4. The specific germ, communicable by human intercourse—the specific cholera-cause—the principal vehicle of which are the intestinal excretions of cholera patients, and possibly also of healthy persons coming from infected places.

5. The disposition of individuals to sicken with cholera.

Pettenkofer, in discussing these different points with regard to prophylaxis, dwells especially on the importance of the first, second, and third in the selection of camps, alluding to the occurrence in the army of Lord Hastings in 1817, and to the huts of the 79th Highlanders on the marine heights in the Crimean war (Report of the Sanitary Commissioners); he describes also the position of the huts of the railway labourers on the Sommering severely visited by the cholera in 1849.

Concerning the fourth point, *i. e.*, the propagation of the cholera germ by the human intercourse, Pettenkofer de-

monstrates the great difficulties connected with a properly carried-out quarantine, and the uselessness of the measure when not quite perfect, and advises, therefore, systematic disinfection of the excreta of all those coming from an infected district during three weeks, and also of all those who live in the same house with suspected or infected individuals. As the most effective and cheapest means for disinfection, he recommends sulphate of iron for solid and fluid substances, and sulphurous acid produced by means of combustion of sulphur for the purification of the air, while chloride of lime, or water impregnated with sulphurous acid, might be used for washing purposes.

Pettenkofer has added a table demonstrating the fluctuation of the subsoil water in Munich in 1864 and in 1865 up to the 7th of October. From this table we learn that the subsoil water rose in 1864 from 15·3 inches below the surface in February to only 12·15 inches in July, and then descended again to 14·6 inches in December; while in the present year (1865) the highest point reached in July was 13·9 inches below the surface, which is 1·75 inches less than in 1864, the fluctuations in the present year being likewise very small. Munich was therefore, according to Pettenkofer's theory, during this autumn less disposed to the development of cholera than during the preceding years.

The theory before us has the great recommendation of being in accordance with most of the generally admitted facts, as the immunity of places built entirely on rocks, the prevalence of the disease in low and moist localities, its predilection for the course of rivers, its usual appearance in summer, when the subsoil water, after its previous greatest elevation begins to recede; and it is, as far as I know, not contradicted by any well-ascertained facts. On the other side, it must be owned that the observations on the relation of the subsoil water to the epidemics of cholera in various localities are, as yet, too limited to allow us to accept the theory as perfectly proved. The importance of the subject is so paramount, and the weight of testimony in favour of Pettenkofer's view is so great, that no time ought to be lost to test its correctness; and it seems to me the especial duty of a society like ours to take this question into serious consideration. In all probability, the examination of the relations of the subsoil water will lead in time to other interesting facts; and already now, after only ten years' observa-

tions, Professor Buhl,* of Munich, has rendered it highly probable that the prevalence of typhoid fever is in intimate connection with the variations of the level of the subsoil water, by showing that at Munich the mortality from typhoid fever varies in the opposite direction with the elevation of the subsoil water, viz., that in the years and in the seasons when the level of the ground water, or subsoil water, is high the number of deaths from typhoid fever is small, and that this number increases when the level of the subsoil water recedes.

* "Beitrag zur Ætiologie des Typhus". By Professor Buhl. Zeitschrift für Biologie. Vol. i. 1865.

ON EPIDEMIC VARIOLOID VARICELLA IN JAMAICA.

By IZETT ANDERSON, M.D., Kingston.

[*Read February 5th*, 1866.]

In the commencement of last year (1863) a peculiar epidemic made its appearance in Kingston and the adjoining parish of St. Andrew's. It appeared to be of the varioloid type, but presented varying characteristics as to intensity. In some of the cases I saw, the eruption was apparently that of simple varicella, while in others, from mere inspection of the eruption, a medical man unacquainted with the character of the prevailing epidemic would unhesitatingly state that they were instances of genuine variola. In all the cases of the disease which came under my notice, there was a tendency to fusion of the two exanthemata. The disease appeared in young and old, and in vaccinated as well as in unvaccinated subjects. One or two of my patients were deeply pitted by a previous attack of small-pox contracted during the epidemic of the year 1852. It was, however, generally speaking, very mild, and in only one or two instances did I feel any anxiety as to the ultimate result. In one child, suffering from hooping-cough with bronchitis, the fever, which preceded the appearance of the eruption, was severe, and accompanied by convulsions; a complication which added much to the danger of the original disease. But the majority of my patients were affected constitutionally in such a mild degree that I did not consider it necessary to confine them to bed, and many of them I allowed to take daily out-door exercise, though in a different climate to this precautions would no doubt have been necessary. The number of cases I attended was as follows:—

Cases in General Penitentiary . .	25
Cases in Boys' Reformatory . . .	40
Cases in Girls' Reformatory . . .	30
Cases in Private Practice . . .	20
Total . . .	115

History.—The first case I saw occurred in a prisoner in the General Penitentiary. He came to the surgery of the institution with the eruption just coming out on the 25th of January, 1863. He had been in prison twenty-two days, and came from the adjoining parish of St. Andrew's. Believing him to be suffering from one of the febrile exanthemata, though which I could not then determine, I isolated him from his fellow prisoners. Two days after another prisoner made his appearance with the eruption just coming out. This second prisoner came from a different locality, and had been in confinement about three months. I carefully questioned the first patient, with the object of ascertaining the origin of the disease; in reply he stated, that he had not, previous to his confinement, been in communication with, or even seen any person with a similar eruption. Other cases now made their appearance, until 25 out of a prison population of 348 were affected with the disease. Besides these, there were I have no doubt a few cases that never applied for medical assistance. (I may state that separation of the prisoners is not carried out to the same extent as in England. They are all daily brought together in muster and for their meals, and at other times as well; they have almost unlimited means of intercourse).

In about a fortnight after the first case in the prison, the disease broke out in the Boys' Reformatory. The two institutions are about three miles apart and in different parishes; daily communication, however, exists between the two, as the refuse food of the prison is taken by the boys for the use of their pigs and other domestic animals. Whether the boys first attacked were thus employed in conveying the food, I cannot say, as they are daily changed. Once introduced the epidemic rapidly spread, and a large proportion was affected.

Again, about a fortnight after the first case appeared in this institution, a case occurred in the Girls' Reformatory. The two reformatories are only about half a mile apart, and weekly communication takes place between them. About thirty of the inmates were affected, though in a very mild form.

In the female prison (which is separated from the General Penitentiary only by a party wall) three or four cases made their appearance, and this when the epidemic had nearly ceased amongst the males. The first case was that of a girl who was discharged from the Girls' Reformatory on the 27th of March, and admitted into prison on the 30th of the same month. On the 3rd of April the eruption made its

appearance. All the cases which subsequently occurred were very mild. The disease seemed to become milder as the epidemic passed or appeared to pass from one public institution to another. In the General Penitentiary the cases closely resembled a mild form of variola, while in the female prison (the last place affected) they could hardly be considered other than instances of simple varicella.

None of my private cases occurred while the disease was confined to the Penitentiary, but during and subsequent to its presence in the reformatories. The inmates of both reformatories are frequently in the town on errands, and some of them affected with a mild form of the epidemic may have been the means of communicating the disease.

Symptoms.— There was in all cases some premonitory malaise and feverishness; but in no instance do I remember continued fever of any intensity to have preceded the eruption. From the observation of a few well-marked cases, my impression is that fever to a greater or less extent existed for two days, and the eruption appeared on the third. The fever was sometimes rather of a remittent or intermittent than of a continued type. This remark holds true, in the climate of the West Indies, in respect of other exanthematous fevers. In measles and typhoid fever I have found this periodic feature to be most marked, so that at the commencement of these diseases I have often, observing the occurrence of a complete intermission, ordered large doses of quinine to be taken, regarding them as cases of malarious fever, and been only undeceived by finding that the recurrence of the paroxysms was not prevented, and that the eruption or other characteristic symptoms of the exanthem made their appearance. If one of these cases of typhoid fever proves fatal, the same necroscopic lesions will be found in the small intestine as if the fever had from the first been of a continued type. These facts show how strongly the malarial poison influences the course of diseases in tropical climates.

The eruption varied very much in different subjects. In all, it was at first papular, and, in the severe cases, first appeared on the face. In some cases there was no eruption of any kind on the face, and but thirty or forty vesicles were scattered over the trunk and limbs. These were the cases of the mildest form. The papulæ, in the course of twenty-four to forty-eight hours always became developed into vesicles. The vesicles generally rapidly filled and became plump and semi-globular, sometimes of the size of a small split-pea. Here and there might, in the majority of

cases, be seen vesicles with the centre distinctly depressed and exactly resembling those of small-pox. When the eruption was sparsely sprinkled over the body, the vesicles were not umbilicated, while in the cases where the eruption was abundant, perhaps half the vesicles were of this description. In the course of a day or two, the contents of the vesicles gradually became purulent. By about the fifth or sixth day the eruption seemed to have reached its maximum development. The pustules broke, and in two or three days more the skin was undergoing the process of desquamation. Often the eruption stopped short at the vesicular stage; the vesicles gradually shrivelled up and disappeared. In several instances I noticed at the same time on the body, the vesicle just commencing to form, the fully developed semi-globular vesicle, the umbilicated vesicle, and the ripe pustule. In a few cases the eruption was confluent, but only on those parts exposed to the light, such as the face and neck, hands and feet. Occasionally a slight degree of ulceration continued for some days, requiring local application for its cure. Discoloration of the skin existed for some time after the disappearance of the eruption. In some cases deep pits were the result of the pustules, and were distinctly visible for some months after restoration to health. This however was the case only in the prison, where the disease was most severe.

In nearly all my cases sore throat was complained of when the eruption made its appearance. On examination a general diffused redness was found to exist on the soft and hard patch of the posterior wall of the pharynx. In a few cases vesicles formed which afterwards became pustular. These vesicles never appeared on the tongue, gums, or inside of the cheeks.

In two or three instances the eruption appeared on the sclerotic conjunctiva, giving rise to some degree of irritation of the eye. In one case a vesicle formed beneath the corneal conjunctiva; when it burst, there followed a slight degree of ulceration. Secondary fever, or anything approaching to it, was almost always absent; in only two cases did I see any thing resembling it in the slightest degree. Slight intermittent fever in some cases preceded, accompanied, and followed the development of the eruption. This was, however, very different from the real secondary fever of genuine variola. Slight critical diarrhœa occurred occasionally when the eruption was disappearing.

The epidemic, of which I have endeavoured to give the salient points of interest, lasted four or five months and then

disappeared, at least from the vicinity of this city. I have heard that it was noticed in some of the country parishes, but I can give no reliable information on this point.

[The following brief memoranda relating to this epidemic are from Dr. Bowerbank of Kingston, Jamaica; they are of no small interest by recording the subsequent appearance of genuine variola in this island.

"March 10, 1863.—We are at present suffering from a severe influenza, and also from a most peculiar epidemic of varicella, I suppose. To me it looks much more like varioloid or modified small-pox; most of the vesicles suppurate, and, in some cases, are distinctly umbilicated, and are sometimes confluent. I never saw varicella like it before."

"January 25, 1864.—We have had among us a peculiar varioloid affection, something like a purulent chicken-pox. Many of the pustules, however, exactly resembled true variola. The disease spread through the Penitentiary and the Reformatory schools, forty or fifty having it at a time. Since this, it has appeared from time to time in a house, and gone through the family; but it did not appear to me at any time to take hold of a district. About six weeks back a man arrived from Colon, on the coast of Panama, in the Mexican gulf. He got small-pox after his arrival here; the case was confluent, and he died. He was strictly segregated after the rash had appeared. The disease did not spread from him. The next packet brought a case from St. Thomas, *viâ* Colon; he was segregated: the disease did not spread from him. The next case occurred in the parish of St. Andrew's; no communication with the other cases, direct or indirect, could be traced. This case has given rise to eight others in and about the same premises, and to two others, viz., a policeman and constable who were in guard over them. Besides these, a case has appeared in Harbour Street in this city; no communication traceable. Yesterday a boy from Spanish Town came to the public hospital here with small-pox; so I fear we are in for it. As usual, no preparations."

"May 7, 1864.—We are now having a few cases of something more like genuine small-pox, but by no means of a fatal type."

In the latter half of this year, 1864, the disease proved very fatal both in Spanish Town and in Kingston. It had spread, moreover, to many of the country districts, in different directions, through the island.]

ON AN OUTBREAK OF DYSENTERY IN H.M.S. *CONQUEROR*.

By HENRY HADLOW, Acting-Surgeon.

[*Read April 2nd*, 1866.]

DURING the service of H.M.S. *Conqueror* in China and Japan, dysentery appeared amongst the ship's company on two occasions, and each time under circumstances of some interest.

The *Conqueror* was commissioned for the particular service of conveying an expedition to Japan to take a prominent part in the operations necessary for forcing a passage through the Straits of Simoneseki. She was a screw two-decker of seventy-eight guns, but to fit her for her special duty the main deck battery was removed and the deck itself converted into a barrack for the accommodation of a battalion of Royal Marines Light Infantry, rather more than five hundred strong, and intended to act as a landing force or for garrison duty, The lower and upper deck guns were left, and the ship's company reduced to 480 of all ranks, who were berthed on the lower and orlop decks. Some supernumeraries were also embarked for the China fleet, and the *Conqueror* left Plymouth, the 19th of December, 1863, with a total of 1056 on board. The voyage to Hong Kong occupied four months, and during that period no sickness prevailed, the sick lists being chiefly made up of the ulcers, phlegmons, and minor injuries that always exist in a ship. The *Conqueror* was detained at Hong Kong from the 17th of April until the 12th of May, awaiting orders. The weather was hot, the temperature varying from 70° to 82°, constantly damp, with frequent rain and heavy mist, and during the period the health of the ship's company suffered severely, and diarrhœa appeared extensively. I find it recorded that the whole gastro-intestinal tract appeared irritable; that loss of appetite and distaste for food were almost universal; that vomiting of the ordinary simple meals was frequently experienced by men otherwise in tolerable health; and that several attacks of urticaria were

observed. The cases of diarrhœa presented nothing of a catarrhal or inflammatory nature, but, on the contrary, the copious, bilious, crapulous dejections, commonly seen to follow irritating ingestion, and it is possible that the change of diet from salt to fresh provisions, and the vegetables and fruits from the bumboat, may have had some share in their production, although the most careful supervision was exercised to prevent any unripe or unwholesome diet being introduced.

Yokohama was reached on the 28th of May, and the weather found cool and even chilly, but with the prevailing mist and damp and frequent rains that are the characteristics of the climate, and the following month on board the ship was much healthier; only seven cases of diarrhœa appearing on the list. On the 7th of June the battalion of Royal Marines was landed, and a site for a camp selected for them on the crown of a small hill, about a hundred feet high, overlooking the settlement. This piece of ground was under cultivation when we arrived, and the crop was hastily grubbed from it, leaving a deep bed of rich humus, two feet thick, saturated with the concentrated dressings of human manure with which the Japanese force their vegetation, and the men encamped under the ordinary single tents without boarded floor. The water supply was chiefly from wells sunk to a considerable depth, and the diet of the men consisted of the ordinary fresh rations of the navy, which include vegetables. The heavy rains and prevailing damp of June were followed by a hot sun in July. The men, after a long confinement on board ship, enjoyed a great deal of liberty; after many months of enforced temperance they were placed in a position to obtain an unhealthy native spirit, sakki, in unlimited quantities, and, after the monotony of a sea dietary, they were surrounded by fruits in the immature unripe state in which they are always found in the markets of Japan.

Under these circumstances dysentery broke out, and in a short time a fourth of the battalion was prostrated. The accommodation for the sick was exhausted, and on the 12th of July thirty bad cases were sent on board the *Conqueror* for treatment, and a temporary hospital established on one side of the main deck; at this time there was no dysentery in the ship, squadron, or amongst the residents on shore. Six days after the patients were received on board from the camp, a case of dysentery originated amongst the ship's company, in the person of a man who had been on shore

and indulged in a drunken debauch, and who was attacked immediately after his return on board. A second case appeared a few days after, and altogether, during the remaining part of the month, four attacks of dysentery are recorded, and diarrhœa prevailed extensively. During the following month, August, the disease spread; thirteen cases were returned as dysentery, and thirty-three of diarrhœa, nearly all of them of a more or less dysenteric nature—in fact, the characteristic looseness that precedes dysentery proper, but stopping short of the more severe symptoms that are considered to belong to the graver disease. During the whole of this time it was observed that men, on the list with other affections, trifling wounds, ulcers, etc., and exposed to the air of the sick bay, contaminated as it was by the smell from the round house or closet, became affected in most undue proportion; at least twelve contracting dysentery or dysenteric diarrhœa whilst under treatment for something else. The disease continued to appear during the remainder of the autumn, until twenty-two cases had originated in the ship, making a total of fifty-two treated, of which seven had a fatal termination.

In this outbreak of the disease it may be argued, with great show of probability, that the same change of climate or air, the same quality of water or miasmatic influence that produced dysentery in the battalion, might similarly introduce the malady amongst the equally unacclimatised ship's company, especially as from the leave given, these had great opportunities for indulgence in unwholesome food and drink on shore. It may be advanced that both bodies of men were suffering equally from deprivation of vegetable food during a long voyage; although, during the detention at Hong Kong fresh vegetables were obtained in abundance. It may be said that both had their capacity for resisting a morbid influence reduced by confinement on board ship, and that on arrival in an unaccustomed climate, where there are circumstances to favour the production of the dysenteric poison, it would naturally tend to appear, and that the supposed introduction of contagion from without, is not at all necessary to explain the appearance of the malady on board. When we examine the circumstances of the second outbreak in 1865, we shall find that none of these objections can apply to it.

On the 24th August, 1865, the *Conqueror* sailed from Yokohama on her return to England, bringing back the battalion of marines, who, as before, occupied the main

deck, a number of time-expired men, and she was also ordered to take the invalids from the China station. During the hot months at Yokohama there had been a good deal of simple diarrhœa; forty-seven cases appeared in July, and twenty-five in August, subsiding to fourteen in September. None of these were dysenteric; the average period of treatment required was four or five days, and of the whole number only two extended to eleven days. Amongst the men received from the naval hospital, Yokohama, was one of the *Conqueror's* crew, with hepatic disease and slight dysenteric looseness, and on the passage to Hong Kong, during a very severe typhoon, in which the men were working continuously for more than thirty-six hours, wet through, and with no cooked food, rest, or sleep, a case of neglected diarrhœa assumed a dysenteric character. On arrival at Hong Kong both these cases, and a number of others, were sent on board the hospital ship for treatment during the refit of the *Conqueror*. During this period of refitting, which lasted twenty-two days, ten cases of diarrhœa were placed on the list, all of the same simple tractable nature as those of the earlier months, the longest only being in the list for four days. On the evening of the 7th of October the sick of the ship returned from hospital, and the invalids of the squadron (about fifty-four in number) came on board. Amongst the former were the two cases of dysenteric looseness sent, both with the disease in a more active state, and a third man who had contracted the disease in hospital; these were placed in the sick bay. Amongst the invalids were a number of cases of dysentery, several of them acute and severe, and these were placed on the after part of the lower deck, the only place that could be found for them in a ship already crowded. The disease was consequently imported into a ship perfectly free from it on the 7th October. Next morning two cases were entered on the list for diarrhœa; one of these was fortunate enough to remain so, and was well in four days; the other degenerated rapidly into a severe case of acute dysentery, and proved fatal in eleven days. And from this time, the day following that on which the dysentery cases were received on board, the character of the alvine flux prevailing in the ship changed entirely, the simple tractable diarrhœa disappeared, and every attack of looseness that presented itself during the remainder of the month was unequivocal and generally severe dysentery. During next month, November, disease of a more mixed character prevailed; eight cases were of undoubted dysentery, and ten

were entered as diarrhœa, although they had nothing but the name in common with the simple docile cases of the previous months, but required periods of treatment extending to thirteen, fifteen, and nineteen days, and subsequent long exemption from night dews and exposure, to effect a cure. These facts strongly suggest the introduction of the disease from without, and that probability is still further strengthened if we continue our examination of the circumstances of the outbreak. It has been already stated that the dysentery cases of the ship were placed in the sick bay, and those of the invalids on the lower deck. Infection consequently existed in these two places in the ship, and it was distinctly *from* these two places that the disease spread. In the sick bay, two men confined there with open sores contracted severe attacks, and the whole of the remaining cases, sixteen in all, originated on the lower deck, not a single instance arising amongst the battalion of Royal Marines Light Infantry occupying the main deck, who were under precisely similar circumstances of water supply, diet, climate, work, and conditions of life generally as the crew, and who only differed from them in not having the infection brought into their midst. The disease was not epidemic; it was distinctly endemic; it did not attack the whole community, but only those sections of it brought into contact with the places where men were already suffering. In all, twenty-one cases were treated in the ship's company, and of these but one terminated fatally, the change of climate after rounding the Cape of Good Hope producing an immediate change for the better. During the prevalence of the disease the weather was almost uniformly fine, the lower deck ports rarely required to be barred in, and the most assiduous attention was paid to the ventilation, and it is, I believe, to this happy accident of light winds and smooth seas, that we may attribute the light visitation with which the ship escaped.

ON THE THEORY AND MODE OF PROPAGATION OF CHOLERA.

By B. W. RICHARDSON, M.A., M.D., F.R.C.P.

[*Read May 7th*, 1866.]

In this Society it is customary to discuss only the origin, the cause, and the nature of the spreading diseases. The rule has its advantages in that it keeps discussion within due bounds. It has its disadvantages in that it shuts off from debate the all important question of treatment. If we could lay down the absolute formula of any epidemic, or if we could separate preventive from curative treatment, the rule would be logical. As things now are, the rule is but an attempt at a logical system—a rule prophetic or anticipatory of the future, and as such convenient and suggestive. My intention in this short paper, and I shall make it very short, is—

1. To take a decided view as to the mode of propagation of cholera, in order to give the Society an absolute basis for discussion on that subject.
2. To consider the theory of the origin of cholera.
3. To suggest prevention.

CAUSE AND PROPAGATION OF CHOLERA.

The positions I am prepared to maintain in respect to the cause of cholera and its propagation may be summed up as follows:—

The cause of cholera lies outside the organism.

The cause, when once in operation, can be carried from place to place.

It can be carried on clothing or on any solid substance. As dried scale, it may possibly be wafted a few feet by the air: but the great medium for its diffusion is water in the fluid state or in the state of vapour.

The poison once set in motion increases in the bodies of infected persons, but only in the alimentary canal.

The evidence is all to the effect that the poison escapes

from the bodies of the infected from the alimentary system only.

The evidence points directly to the fact that in cases of infection the poison is always, and only, received by the alimentary canal.

The Society will perceive from these statements that I take up substantially the theory of cholera propounded originally by the late Dr. Snow. This is true. My experience from the death of Dr. Snow until this time tends solely and simply to confirm his theory in all its parts; and, with some slight modification on the subject of the primary origin of the poison, I conclude that the theory, by its precise and demonstrative character, excludes all other theories.

Dr. Snow, at various times, adduced many and striking cases of communication of cholera in support of his views. It would be waste of time for me to repeat these illustrations, but certain facts have occurred since his last work which should be faithfully brought forward.

In regard to these evidences I may first refer to the results of certain labours of our Society. After the close of the Crimean campaign, the council of the Society issued a series of questions to the officers of the Black Sea fleet in relation to the epidemics of cholera that prevailed in the fleet during the occupation.

The whole of the facts obtained are published in our volumes of *Transactions*, and, at the expense of our late beloved and esteemed President, have been carefully tabulated. These facts admit of being briefly set forth thus.

At the time of the outbreak of the cholera the population of the fleet numbered 12,572 men. These men, all living under the same conditions, except in one particular, yielded 710 cases of cholera, and 397 deaths. Of these cases in the gross 91·26 per cent. of the men attacked were supplied with water derived from springs at Baltschick, a spot on which French troops had been quartered while suffering from cholera; the troops had washed their clothing at these springs, and the ground for a great distance around was saturated with their excreta. The remaining 9·74 per cent. of the infected were supplied with water partly from Baltschick. Three other crews of vessels suffered from severe diarrhœa. Of these two positively took in water from Baltschick, and the third probably so. In one vessel which used distilled water, water condensed from the steam of the engines, cholera broke out, a circumstance which might at first sight appear to go against the water dissemination

theory; but on examination it turns out that this water was passed to the tank through a foul hose pipe, by which it was made impure. In all the other ships supplied with distilled water not a case occurred. The contrast is most striking; an experiment, devised for the direct determination of the truth, could not be more demonstrative.

The evidence is not less conclusive when we pass to the facts which bear on the progress of the disease amongst the officers and men of infected vessels. I find that the officers in such ships as were attacked were in the proportion of 1 in 177, the men in the proportion of 1 in 16·29.

Reading the narrative as it stands, I see no way in which to account for the comparative exemption of officers, except the very obvious one that the men, as a body, partook most freely of the infected water with which the ships were supplied without disinfecting it by heat. The officer took his wine, tea, or coffee; the sailor, his grog. That the disease did not become distributed amongst the crews by mere personal contact with the infected is proved by the fact that in one ship several infected persons were removed, and that there was not a case of communicated disease amongst those who received them.

The whole history of the epidemic which made its appearance in Europe last year is a vast record of the propagation of the disease by one plan, a plan uniform and unmistakable. From the time when the disease was disseminated from the mountain of Arafat, after the festival of the Kurban Bäiram, it moved in its course with the precision of a human traveller. It never hid itself, and it rarely was lost to observation; it was moving invariably at the same rate as men move; it paid no heed to the winds, and it attacked indiscriminately all who came in its path. The coward who blindly ran in its way fell, but the bravest of the brave who also came in its way fell equally, and as the cowards generally got out of its way, it destroyed far more of the brave than of any other class. Following the great lines of human intercourse, it demanded, in nearly every case, a ship for its transport; it took its passage on board without disguise; landed, declaring itself present, and either stopped where it landed or journeyed inland accordingly as the residents in the coast towns chose to let it. Always ready to progress, and steadily progressing when left free, it was invariably arrested by very simple means whenever correct means of suppression were put forth. A robber or murderer prowling about the world may elude us by his intellect; a poisonous animal may elude

us by its cunning; but cholera, impersonal as it was and is, was at all times ringing its own alarm-bell, and following out its own regular and natural course.

Incidents not a few and of the most striking character stand out to attest the mode of propagation of cholera, and to prove that by water supply the disorder was most commonly reproduced. In Constantinople one of these signal evidences was made manifest. Mr. Blogg, who was present during the worst of the epidemic, has been good enough to furnish me with a fact that came under his own direct observation. It is this: The wearing apparel, the bed-clothes, and the mattresses of a cholera patient were washed at one of the fountains of the city in the neighbourhood of Tavatola. The waste pipe of the fountain being broken, this foul water became mixed with the drinking water of Tavatola. In one day after this event sixty persons in the small, and up to that time healthy, district were stricken with the malady.

In Paris, if all the facts had been published, similar truths were laid open; and one enterprising and eminent physician —Dr. Vacher—was so clear in his views on this subject that he wrote to the Administration, begging to have water from the public reservoirs that he might determine the organic impurity. The authorities, knowing necessarily what the disclosure would be—well aware, in fact, that the water of Paris was poisoned with organic matter derived from sewage —refused in a tone of the most peremptory kind, this simple request. Their argument in favour of refusal showed the importance of Dr. Vacher's suggestion. In 1832 the people of Paris, driven by the force of inexorable evidence to the belief that they contracted the disease—cholera—from drinking the water of certain wells, drew, in a period of great political excitement, the false inference that they were intentionally poisoned. This suspicion caused in that day great anxiety and danger. The present authorities of the city refused, therefore, on this ground, to renew any inquiry respecting water that should be likely to lead to the recurrence of a similar suspicion. In vain Dr. Vacher showed that at Sèvres frequently recurring choleraic attacks of an epidemic form had presented themselves so long as the inhabitants were supplied with water from the polluted Seine, while since they have been supplied with water from an artesian well there had not been a single epidemic of the kind; in vain he brought forward the experience of England; in vain he protested that he wished to raise no political or popular tumult, but asked only to be allowed a right which belonged

to every man who paid taxes. The Government remained firm in its determination, and impure water for the active general distribution of cholera remained in Paris to fertilise the disorder and carry it from house to house and man to man.

The short epidemic in our own country in the months of September and October of last year is not less illustrative of the precise mode in which cholera spreads from any centre in which it is located. Of this the outbreak at Epping affords a characteristic example. In this example the centre of the outbreak was a lone house standing on an elevated position. There was in the house no over-crowding, no deficiency of food, no impurity of air, no injurious mental influence; the weather was not hot, the meteorological conditions were in no degree peculiar, and if they had been they would have accounted for nothing, inasmuch as hundreds of persons were subjected to the same influences, and were not affected. But into this house, on September 25th, Mrs. Groombridge, suffering from choleraic disease, entered, and on the 28th exhibited the disease in the extreme form. Next her daughter was seized and succumbed; next a farm servant living on the premises was seized, but in the end recovered; next one of the medical attendants on Mrs. Groombridge, Mr. McNab, took the disorder, and sank under it. On October 2nd another daughter and the housemaid were severely attacked, and four days later Mr. Groombridge, a servant named Riley, Mrs. Parsell, and one of Mr. Groombridge's sons came under the influence of the poison, and all except the youth died. One day later a woman named Saville, who attended upon and laid out Riley, contracted the malady and also died.

And now the disease, so virulent in its symptoms, so fatal in its effects, suddenly stayed. Not another case occurred; all the conditions remained the same, with one grand exception, but yet the disease was stayed. The exception to which I refer was the water supply. There was a well on the premises by which the house was served. This well gave forth very hard water, and it had long been known that the water was impure. The elder Mr. McNab had a suspicion of this well, and the very last letter he wrote to his son, Mr. Duncan McNab, contained a postscript suggesting that the well should be opened. At this juncture Mr. Clegg, of Epping, came on the scene, and struck with the facts presented to him, acutely traced out the source of mischief. The well was laid open, the water supply to the house was changed, and there was no more disease. After-

wards our own indefatigable Hon. Secretary, Mr. Radcliffe, on behalf of the Privy Council, examined the relationships of the drainage and sewage of the house and the well, and discovered below the pipes leading from the water-closet and from the eye-hole of the sink through which the choleraic injections had been passed, a leakage, which extended under the foundations of the building and entered the well. The sewage was distinctly traceable on the side of the well corresponding with the leakage in the drain.

Thus we have before us a case, clear as scientific observation of the most rigid character can demand, of direct and indirect poisoning. The induction is perfect: we observe a series of phenomena of the broadest type; we say, "for these phenomena there must be a cause;" and our inquiries are simplified to the utmost because they are localised and fixed on one small spot. We now challenge every possible cause, and it breaks down until we come to the impure water. Here we rest; there is something tangible. We analyse this mode of causation, and we find it true and sufficient to account for the phenomena. We drive the analysis to the extreme; we see the cause removed, and straightway the phenomena disappear.

So far the teaching of Dr. Snow stands out in these great experiments without change. But, unalterable as are the bases of the theory, it admits of additions which strengthen it and make it more complete.

Dr. Snow did not sufficiently recognise that the vapour of water was an active means of conveying the choleraic poison. This truth, however, has been abundantly proved since his death. My friend Mr. Watkins, of Towcester, has shown, in a paper marked by singular acuteness of observation, that in the last epidemic which occurred in his district the persons most constantly and fatally attacked were the women who washed the clothes of the sick. This circumstance, which has been largely confirmed by other observers, is almost a necessary occurrence. Unless every portion of the garments washed were actually exposed to 212° Fahr. instantaneously, the organic poison would (at lower temperatures) begin to pass off with the vapour, and those exposed to the vapour could only escape, I had almost said, by accident.

Dr. Snow, again, did not recognise the escape of the poison from the infected body directly in the form of water vapour. This is a point of the greatest importance, because it determines the dissemination of the poison to a considerable de-

gree. Thus when the temperature of the air is low, the fluid excreta condense on the body or on the clothing, and the poison is confined and limited in its effect; but when the temperature is raised, the poison disseminates readily in the vapour of water from the fluid exhalations. This is, I believe, without any further mystery, the reason why cholera always spreads most easily when the temperature is moderately high. We have evidence in the epidemics that have occurred in Scotland, in Russia, and in Poland, that when the poison of cholera enters the organism, it is capable of action under the influence of the animal heat, whatever the temperature of the day may be. But we also have evidence that a rise in temperature increases the spread of the disorder. This is in accordance with nature. Presuming that at a low temperature the disease were making its way through a community by the diffusion of impure water alone, it must follow, as the result of a modified physical condition, that a rise of temperature sufficient to transform the fluid poisonous excreta (the poison being equally soluble in the vapour of water as in water itself) into vapour must lead to a more determinate development of the disorder.

And for the same reason cholera spreads most easily in crowded rooms. In these rooms the temperature is artificially raised, and hot fluid foods, prepared often in the rooms, and always introduced into them, surcharge the air with moisture and heat. In such an atmosphere the poison of cholera in vapour of water finds an equable and easy surface for distribution; vapours acting virtually as vacua the one to the other.

Once more, in modification of Dr. Snow's view respecting the propagation of cholera, I think that larger experience, from the time he moved amongst us, has shown that the dried choleraic matter deposited on infected clothing may be carried further and more readily than he supposed.

Lastly, we may perhaps with some fairness believe that he urged rather too strongly the idea that the choleraic poison is often conveyed on the hands of attendants, or on utensils that have received it.

THE ORIGIN OF THE POISON.

While we are thus bound to modify Dr. Snow's minor observations respecting the mode of propagation of cholera, we are also bound to take a different conception of the origin of the cholera poison.

It will be well remembered in this place that our distin-

guished colleague held to no point so tenaciously as the non-spontaneous origin of what he called the "cholera cell." This was a perfectly natural position for him to take, because in his time the germ or cell theory of disease was predominant and because no suspicion even had been offered that organic poisons, or rather poisons derived from organic animal substances, could take any except the cell form. This being the prevailing thought, the question of the origin of the assumed cholera cell merged into the question of the spontaneous generation of organic cells altogether; and as the universal evidence was opposed to spontaneity, Dr. Snow, with the rest of the thoughtful of his compeers, held that the cholera cell always demanded for its reproduction a pre-existing cell.

In this particular I believe him to have been incorrect, not from opposition to the truth, but from his wanting possession of those advances in physical medicine that have been developed since he died.

An observation made originally by myself last year on the nature of the poisonous products of pyæmia, throws a new and simple light on this question of the origin of organic animal poisons. In experimenting with the albuminous exudative matter derived from the diseased open surface of a patient suffering from pyæmia, I found that the poisonous matter presented the characters of an alkaloid. I learned that it was derived from the decomposition of albuminoid substance; I marked it as an "animal alkaloid," I named it "septine," and I showed that by its mere presence on a secreting surface it transformed albuminous secretion into matter like unto itself.

These researches on the existence of an alkaloid occurring in the body during disease have been this year singularly confirmed physiologically by Dr. Bence Jones's discovery of an alkaloid natural to the tissues, which alkaloid is also common to albumen, and which he has named "quinodine."

With the facts before us that from albumen organic alkaloidal poisons can be formed by mere physical change of elements, the hypothesis of the necessity of cell growth for the production of organic animal poison falls to the ground. We need not now enter on the question of spontaneous generation at all; the formation of the poison, although from organic substance, has nothing to do with the origin of life; the poison is a purely chemical change of organic substance; a resolution rather than a construction; a movement from the active or so-called vital towards the inert or dead condition of matter.

In respect to cholera: the view that the poisonous matter is in the excreta in the form, not of an organic cell, but of an organic animal alkaloid, makes what was before difficult perfectly simple. As the exuded or excreted matter from a wounded surface can, and does—under certain conditions of oxidation which we have yet, by a few simple experiments, to learn—produce pyæmic poison, so the excreted matter from the alimentary canal is equally capable, under peculiar conditions of oxidation, of producing an alkaloidal organic poison, which, soluble in water, but admitting of deposit on desiccation, passes easily from one person to another under the agency of those physical states which we have seen as peculiar to the development and progress of the epidemic.

PREVENTION OF CHOLERA.

On the theory of cholera which I have endeavoured to present, the means for the prevention of the malady are few and simple.

These means are of two kinds—administrative and personal.

On the part of administrative bodies, whether governmental or municipal, the first point for them, during the invasion of cholera, is to prepare abundant and perfect accommodation for the reception and treatment of the sick apart from the healthy. In seaports it is proposed that this shall be done by making use of worn-out ships. This I take to be a dangerous suggestion. Such ships are dark, the woodwork is dilapidated; the drainage, if I may use such a term, is bad, and the ventilation imperfect. I am quite of opinion that a floating hospital is better than a hospital on shore, and is much safer; but such hospitals afloat require to be built on simple and correct principles; they can never be extemporised.

The municipality should set apart hospitals of small size, removed as far as possible from other residences, and furnished with all requirements for the treatment of the infected.

Both government and municipal authorities should see that in no instance should impure water circulate through communities for drinking or domestic purposes.

An Act should be passed for regulating the disposal or disinfection of clothing that has been used by choleraic patients. I have direct evidence that during the last epidemic the whole of the saturated bedding, bedclothes, and wearing clothes of a large family affected with cholera were

cast, *en masse*, into the Thames. I have also direct evidence of the importation of the disease into a small inland town by means of a box of unwashed clothes sent from the house of a man who had died of cholera, in order that they, the clothes, "might be useful" to the brother of the dead man. These things are done in ignorance, but they can never be prevented unless the legislature make them offences against the public safety.

Disinfecting rooms, established in connexion with baths and washhouses, would be of the greatest importance in preventing the transmission of disease.

The personal treatment for the prevention of cholera consists, firstly, in seeing that the sick man is supplied with water free from impurity—with water that has been distilled, or at least boiled; secondly, to see that the excreta of the sick are carefully removed and destroyed. Properly, all such excreta, received in white earthenware vessels, should be treated with common nitric acid, and then poured on newly-dug earth. They should never enter a drain.

The clothes removed from the cholera patient should be immersed at the moment of removal in cold water, and should be kept covered with cold water until they can be transferred, over a fire with a brisk chimney draught, into a cauldron of water in a state of active ebullition. By allowing the infected clothing to dry rolled up, and by afterwards merely scalding it, as is the common practice, the most certain means are adopted for disseminating the disease.

The room in which the cholera patient rests should never be surcharged with water vapour; on the contrary, means should be taken to absorb the water of the air around the bed of the patient. This can be very effectively done by merely charging common earthenware spittoons with strong sulphuric acid, and placing them under or near the bed. In furtherance of the same object, thick, double-necked glass globes, containing chloride of calcium, might also be placed under the bed. I need add nothing in regard to the necessity of cleanliness on the part of the attendants.

The best of our public non-professional writers, when speaking of cholera, indulge in descriptions which sound of middle-age ignorance at the lowest of that age. Here is one to-day who says of the disease, "It springs from misery, filth, and thin blood, aided by contagion and fear;" and here is another who says that "the profession of medicine knows no more of the disease than the commonest scholar."

I cannot reason with these, but I want to reason with the medical profession. I want the profession to recognise the preliminary truth that for the specific disease cholera there is only one specific cause, as there is only one cause for small-pox. This agreed upon as premise, I want the profession to settle whether it be true that the cause of cholera is always the modified excreta of the alimentary canal.

On my side, I am prepared to stand forward whenever called upon to prove this as fact; to prove that this explanation of cause accounts for all the phenomena, and that no other theory accounts for any of the phenomena.

Thus standing, I will be open to conviction to the contrary, if fair, and just, and reasonable argument sustain the contrary. Until then I maintain that there is no disease the cause and course of which is so demonstrably defined as cholera; that the whole demonstration has been worked out by the medical profession; and that if that profession has not energy enough to test, to prove, and to claim its own learning, it deserves to be discredited of its own prize, even with the prize in its grasp.

But if the profession is to speak with authority, from whom shall come the first word except from the Epidemiological Society? For sixteen years this simple question has been before the Society, and the Society has answered nothing except by its individual members.

I challenge it to proceed. The theory admits of no compromise, no reservation; it is either all and absolutely true, or it is all and absolutely false. Let the Society adjudicate. Let it adjudicate not by an instant aye or no, but by inquiry and solemn deliberation. If it meet night after night for a year, let it answer. I pronounce the theory absolute and true, and to give it a fair trial I will undertake its defence; but I will bow to the Society when it judicially speaks on all the evidence. For this decision, not I alone, but the profession here and everywhere calls, while the hesitating world waits in ignorance, fear, and despair.

VALEDICTORY ADDRESS.

By GAVIN MILROY, M.D., PRESIDENT.

[*Read June 4th*, 1866.]

You have just heard, gentlemen, in the report of the Council, the chief work in which the Socicty has been engaged, in addition to the reading and discussion of papers at the monthly meetings during the last twelve months. Allow me briefly to note two or three other matters which the Council had in hand immediately before, as this will show the variety of subjects which has occupied attention while I have had the honour of presiding over their deliberations.

In the spring of last year, the report on the questions relating to the classification of epidemic diseases which had been brought under their consideration some eighteen months before by Dr. Farr, one of our Vice-Presidents, was published, together with the replies on the subject received from many men in the profession whose authority, from their high position in the public service, was entitled to peculiar respect. I will merely recal to your recollection the third question, which is the most important one, and the conclusion respecting it to which the Council came, after having carefully weighed the opinions expressed thereon.

"Do you think that the classification which has been in operation for many years, and is now in operation in the returns of the Registrar-General, should be altered at the present time; and if so, what would you substitute for it?"

In reply, the Council stated that, "considering the sentiments expressed by the principal officers of the Medical Departments of the Army and of the Navy, and by other eminent members of the profession; and considering also the inconvenience of employing different systems of classification for the registration of deaths in the three great divisions of the United Kingdom, as well as in some of our colonies, it is very desirable that the attention of the go-

vernment should be directed to the subject, in order that steps may be taken for its further investigation, in relation to the recording and tabulation of diseases in the public services, and to the registration of the causes of death throughout the empire."

The subject, I may add, is still under the consideration of the Committee of the Royal College of Physicians, which has now for several years been engaged on the nosology and nomenclature of diseases.

After the very fatal epidemic of yellow fever at Bermuda in the autumn of 1864, which caused such loss of life both in the army and navy stationed there, as well as among the civil population, an inquiry was ordered by the War Office, in conjunction, I believe, with the Admiralty, and with the local government of the colony, in order that a full and searching inquiry might be made into the history of the visitation. At the invitation, personal and unofficial, of one of the members of the Committee which was to superintend the investigation, a series of interrogations was prepared by the Council with the object of directing the attention of the authorities on the spot to the various points which it was deemed of chief importance in an epidemiological point of view to determine. The report of the Committee has not yet been published, but it will I presume soon appear.

As bearing, I trust, on the prospects of acccurate epidemiological inquiry in our own country, the recent appointment of Dr. Edward Smith to be medical officer to the Poor-law Board, as well as one of the inspectors of the Board, will be hailed with much satisfaction. The Memorial addressed in 1863 by the Society to the President of the Poor-law Board, and sent to all the members of the Committee of the House of Commons then sitting to inquire into the laws relating to pauperism, strongly urged a systematic registration of the sickness and mortality among all the pauper population throughout the kingdom, and pointed out the benefits that might be expected therefrom to statistical and to sanitary science. That memorial was printed in the report made by the above Committee to Parliament.

You will all, gentlemen, have sympathised in the tribute of heartfelt sorrow expressed by the Council at the recent death of our venerated chief and long-tried and beloved leader, in whose devotion to our cause we had such unbounded confidence. As one of the few present who were associated with him in the foundation of the Society, I feel his loss most deeply, both as a dear and personal friend,

and one for whom I had the highest admiration as a member of our profession. [The remarks here made on the character of Dr. Babington are embodied in the brief memoir of his life at the end of the volume.]

We had the misfortune to lose, in October last, one of the ablest and best known of our non-resident members, in the person of Dr. Herbert Barker of Bedford. From the commencement of his professional career he distinguished himself among his fellow-students by his energetic zeal and activity in the acquisition of knowledge, and he was one of the first, and not the least eminent, of the earliest graduates of the University of London. Soon afterwards, he obtained the fellowship of the College of Surgeons by examination, and won the Fothergillian Medal of the Medical Society by his essay on "Malaria," which, by its experimental researches on the influence of pythogenic effluvia on health, and by the general ability with which the whole subject is handled, met with much favour at the time of its publication. Subsequently, he carried off the Sir Charles Hastings' Prize of the British Medical Association, by an excellent memoir on "Disinfection." To high professional attainments he added an ardent love for general science. He was one of the best meteorologists of the day, and for many years was a constant and prominent contributor to those remarkable series of observations on which the late Admiral Fitzroy based his well-known system of weather signals; astronomical observations, too, engaged a good deal of his spare time. For his contributions to general science, he was elected a Fellow of the Royal Society of Edinburgh.

Dr. Barker was altogether a man of high intellectual aims and aspirations; he possessed no small portion of that "last infirmity of noble minds," the passionate desire to excel and "win the meed of high renown." By his death the body of general practitioners of England have been deprived of one of their most distinguished ornaments.

A blank has occurred in our list of Foreign Corresponding Members by the death last autumn of M. Adolphe Trebuchet, Secretary of the Council of Public Health of Paris, and long known as one of the most eminent and influential authorities on public hygiene in France. He was a member of the Academy of Sciences, officer of the Legion of Honour, and decorated with the insignia of numerous other orders. His relationship to Victor Hugo is also enumerated in the French journals as worthy of record. M. Tre-

buchet had published various works relating to public health, but of these I have not yet obtained a list.

Gentlemen, the present is a period of more than ordinary interest to the epidemiologist, alike from the notable events which have been and are occurring around us, distant or near, and from the fluctuations and reactionary movements in medical opinion in respect of many of the phenomena connected with these events. Last summer, it will be remembered, was marked by excessive heat and by other meteorological peculiarities in other lands as well as in our own. The occurrence for the first time in our annals of genuine yellow fever in a series of well-marked cases, consequent on the arrival of an infected vessel from the West Indies at Swansea, is a fact to be noted in the medical history of the year. Taken in connection with a similar occurrence, three or four years before, at St. Nazaire, at the mouth of the Loire, the subject will, it is to be hoped, be considered at one of our meetings next session, as it well deserves to be alike from the public importance of the events on both occasions, and from the results of the measures adopted in each country to arrest the apprehended danger.

As to the disastrous murrain, which will ever render 1865 a memorable year, I will only remark that the mere circumstance of a disease, after more than eighty years absence from the country, again manifesting itself among us, and spreading as a pestilence over the land, is in itself a fact of the highest epidemiological interest. Considering the enormous importation of live stock from different parts of the continent of late years, it is certainly difficult to imagine that no infected cattle had ever been brought into our market prior to last June. The important problem, whether there is any connection or inter-relation between synchronous, or nearly synchronous, spreading maladies in man and among some of the lower animals, still awaits careful investigation. It was only the other day that Professor Ferguson, of Dublin, a high veterinary authority, stated with confidence, in an official memorandum, that epidemic puerperal fever is, in Ireland, almost always preceded or accompanied by a similar disease among breeding cattle, and he pointed to the present season as affording a fresh illustration of the fact.

To the subject of epidemic cholera, and the many epidemiological questions which its consideration involves, it is unnecessary for me again to allude after the remark I offered at the beginning of the present session. The asso-

ciation and working together in our ranks of military and naval medical officers along with men in civil life, give us signal advantages in the examination of many of those questions which continue to agitate the professional mind. The more that this cooperation among the several sections of the corporate body of our profession is carried out in the investigation of epidemic diseases, the more surely and the more speedily will determinate results be arrived at on numerous topics now of uncertainty and dispute. Our regiment, gentlemen, is well organised and well officered, too, but the strength of our ranks is insufficient; we want increase of members, and increase in the sinews of war to carry on effectively the manifold and diverse operations we have taken in hand. Let me earnestly commend this matter to the zealous consideration of all. And now it only remains for me to offer to you my most hearty thanks for the countenance and support you have uniformly given me as your President, and to express my lively hope that increasing success will attend from year to year the labours of our Society in its career of public usefulness.

ON SCURVY IN THE MERCANTILE MARINE.*

By WALTER DICKSON, M.D., R.N., Medical Inspector of Customs.

[*Read June 4th*, 1866.]

THE subject of scurvy in the merchant navy has of late excited a considerable amount of attention. It is surprising that, in the present state of our knowledge, a disease so easy of prevention and cure should exist at all. But that it should especially infest the ships of a country like England, placed in the foremost rank of maritime nations, is a lamentable fact unworthy of an age which boasts, and not without reason, of its enlightenment, philanthropy, and material progress.

I purpose in these observations to give some account of a series of investigations which I have been called on to make during the last two years by direction of the Board of Trade, with the view of ascertaining the origin of the disease in various ships which have arrived in the port of London, and in which cases of scurvy were either so flagrant or so numerous as to demand the notice of the Government.

The medical officer of the Privy Council had, in his Annual Report for 1863, given sea-scurvy a conspicuous place among preventable diseases requiring further State interference. At his request, Dr. Barnes, one of the physicians of the *Dreadnought* hospital ship, produced a valuable report, so complete and exhaustive, as to leave little to be desired. The records of that noble and truly catholic charity abounded with illustrations of the disorder in every degree of intensity, and there is probably no existing institution where it can be studied to such advantage. Dr. Budd, during his tenure of office as physician, had contributed the fruits of his experience in an elaborate and still standard treatise which was published about thirty years ago in the *Library of Medicine*. Indeed, it is to the medical officers and managers of the *Dreadnought* that the authori-

* Much of this paper has since appeared, under another form, in the "Lancet" of January, February, and March, 1867.

ties and the public are indebted for having the subject forced on their attention. Dr. S. Ward has contributed some most instructive clinical lectures on scurvy and other maladies incidental to seamen; and the present resident medical officer, Mr. Leach, has distinguished himself by his assiduous and zealous endeavours to expose existing abuses and to obtain justice for the helpless and friendless class of men who come under his care.

The most unsatisfactory feature in the recent history of scurvy is, that notwithstanding acknowledged improvements in the condition of seamen, the disease appears to have increased during the last fifteen years rather than diminished. The number of cases received on board the *Dreadnought* in that period has varied from 50 to 150 in the year, the mean number of admissions annually being about 90; and, as a rule, more numerous in the latter than in the earlier years of the period. The average proportion of scurvy to all other diseases and accidents received into the hospital has been 1 to 24, or 42 per 1000. Even in last quarter the cases admitted were 39, a large number as compared with corresponding quarters of 3 years, viz. 22, 20, and 15. At the other great sea-ports, the ratio has been equally high. At Liverpool, for example, in six years, 228 cases were received into the Southern Hospital. Taking other hospitals of that town into account, not less than 50 cases are annually treated at Liverpool. And in all these, it must be remembered, the scorbutic symptoms are of considerable intensity. The minor forms of the disease mostly escape professional notice, but they are notoriously very prevalent. At the Poplar Sailors' Home, according to Mr. Corner, one-half of the inmates are affected in some degree, and one-twentieth are seriously afflicted.

If we now turn to the scurvy-stricken ships, we shall find the proportion of sick among their crews to be often very large. In a list of 26 vessels given by Dr. Barnes the ratio is stated as ranging from 9 per cent. to 90 per cent. on the strength. The crews of these ships averaged 20 in number, and the mean proportion of cases of scurvy they yielded was 4, being at the rate of 20 per cent. In the vessels inspected by me the proportion of cases has been very similar, and, as in the others, chiefly occurred in ships from Liverpool, Sunderland, Glasgow, etc. It would seem, therefore, that our north country ports have an unenviable pre-eminence in this particular. The voyages most productive of scurvy are those from India and China, as might be ex-

pected from their length; for the disease seldom breaks out in less than 60 days, and the duration of the passage from the eastern ports varies, for the most part, from 90 to 150 days. Any gross defect in the diet of the crew will therefore show itself in an unequivocal manner in the last days or weeks of the homeward voyage.

The cause of scurvy is so well known, that it is unnecessary to discuss it. In whatever degree certain conditions of the individual, and certain kinds of aliment, may predispose to and hasten its manifestation, the disease is, in all cases, directly owing to the absence from the food for some time of fresh vegetable matter. The remedy is of the most obvious and simple kind, and, except in extreme or complicated cases, is invariably effectual. But (rare thing in our art), the preventive treatment is equally simple, easy of application, and infallible. In the systematic use of a wholesome and very agreeable beverage we have an undoubted specific, the efficacy of which has been amply tested in every sea and in every variety of climate. It is singular that this happy expedient of lime-juice, which in the last eighty years has saved so many thousand lives, and has helped, in no small degree, to build up our country's greatness, should have had to struggle into notice very slowly, and with much opposition. Woodall, a surgeon of London, in the year 1636, described its powers in terms as graphic as they are quaint:—

"I find we have many good things that heal the scurvy well on land, but the sea chirurgeon shall do little good at sea with them, neither will they endure. But the use of the juyce of lemmons is a precious medicine and well tried; being sound and good, let it have the chief place, for it will deserve it. It is to be taken each morning, two or three spoonfuls, and fast after it two hours; and if you add one spoonful of aqua vitæ thereto, to a cold stomach it is the better. Some chirurgeons also give of this juyce daily to the men in health, as a preservative, which course is good if they have store, otherwise it were best to keep it for need. I dare not write how good a sauce it is at meat lest the chief of the ship waste it in the great cabins to save vinegar."—*Surgeon's Mate or Military and Domestic Medicine.*

Woodall's knowledge of lemon-juice was probably derived from an older time, yet it was more than a hundred years after his day before its antiscorbutic qualities were fully recognised, and it was enlisted as a most valuable ally in our greatest naval war.

It is still more singular that although employed with un-

failing advantage for the best part of a century in the royal and higher class mercantile marine, lemon-juice should still be unappreciated and rejected in so many quarters, and that even where it is used, its utility should so often be marred through ignorance and prejudice in regard to the details of its preservation and mode of issue. And yet these details are of so simple and obvious a character that it would seem almost a waste of time to dwell upon them. But we find in every day experience that it is from a want of knowledge of these apparently insignificant minutiæ rather than from any wilful neglect or perversity of judgment, that an invaluable remedy has in some measure lost its reputation, and has even come to be doubted by those who are most interested in using it.

Some captains will attribute the disease to cold, as it most often makes its appearance when the vessel gets into the more northern latitudes, and when there is a considerable and rapid fall of temperature; some will ascribe it to debility or constitutional peculiarity of the individuals attacked; others will look on it as, in almost all cases, the manifestation of a syphilitic taint, while a few entertain the idea that when it once appears it is propagated by contagion —a weak person has at first been affected, and from him it has been communicated to the rest. Yet these officers are, in general, shrewd and intelligent men, and, although the tie betwixt them and their crews is of a comparatively slight and temporary kind, I believe that, with few exceptions, from motives both of expediency and humanity, they have the material well-being of the seamen at heart. Among the men there appears to be an equal divergence of opinion. Bad provisions, bad water, are most often alleged as conducing to it, and sometimes bad treatment. Unless the question is put directly to them, both officers and men agree in ignoring the real cause of the malady, viz., the absence of really good and efficient lime-juice, or irregularity and neglect either in issuing or consuming it. It may be broadly stated that in almost every case of the manifestation of scurvy the lemon-juice was proved to have been either originally spurious or to have become deteriorated by the faulty mode in which it was preserved; to have been issued carelessly or irregularly, or to have been systematically declined by those who should have drunk it. It not unfrequently happens that, from exposure to the air in a tropical climate, lime-juice has undergone decomposition, and become positively loathsome, and that the men are therefore

quite justified in refusing a draught which, besides being nauseous, is altogether useless.

There is also a so-called lime-juice, pleasant to the taste, and so closely resembling the genuine article both in chemical composition and flavour, as to be by the uninitiated almost undistinguishable. It is prepared artificially from citric acid, and is preferred by many captains as being much less liable to spoil than the true expressed juice of the fruit. Although extensively used, I believe this compound to be greatly deficient in curative or prophylactic virtues, if indeed it possess them in any degree whatever. To this plausible sophistication even more than to grosser adulterations may be chiefly attributed the ill repute into which lime-juice has of late most undeservedly fallen. I have found, in several instances, that the use of this artificial lime-juice did not prevent the outbreak of scurvy in a highly aggravated and even fatal form. There is reason to believe that reliance on it, and all similar compounds, is entirely misplaced, and that misconception on this point, and the erroneous practice thereby engendered, have been a fertile source of scorbutic disease. Indeed, it seems highly probable that this well-meant, but futile, endeavour to improve on the unimprovable has been an efficient factor in causing the very remarkable increase of scurvy in recent years.

In London and all the greater ports, lime-juice can be obtained in abundance at a reasonable price, and of perfectly satisfactory quality. There seems to be no doubt that the great majority of ships are supplied with a genuine article. But by a curious perversity of custom this perishable commodity, of such essential importance, is not treated with the care that would be bestowed on beer or wine, or other liquid of vegetable origin. In most of the vessels I have visited it has been stowed in bulk in a cask of considerable size (from fifteen to twenty gallons) supposed to last the whole voyage of ten or twelve months, without any spirit being added for its preservation, and opened at intervals of a week or two to allow of a quantity to be drawn off for use. Exposed in this manner to the air, crossing the equator four times, and agitated by the incessant motion of the ship, it is not surprising that it should lose most of its original properties. In truth, it is singular it should preserve any of them, and should not invariably undergo a change to the repulsive-looking liquid which in my inspections I have sometimes seen, and of which I now show you some specimens. But with due precaution lime-juice may be kept for

periods far exceeding the length of any modern commercial voyage with unimpaired efficacy. Although placed otherwise in most unfavourable circumstances, the second North Polar expedition, under Parry, did not suffer until they had been dependent on their ship resources for more than twenty-seven months, and in the latter expedition, under M'Clure, Dr. Armstrong informs us that a similar period elapsed without any sign of scurvy. So much was I impressed with this prime defect in many merchant ships, that at the very outset of these investigations I insisted strongly on an alteration in the mode of packing lime-juice.

The Board of Trade in some degree acted on this recommendation by causing a large number of copies of my report to be printed and sent to all the local marine boards at the various ports for general circulation. Time will show whether the advice has been generally followed. Some traders now supply it in one or two gallon jars, but even this, although a great improvement, is in my opinion too large a quantity for the purposes of a small crew; for it must be remembered that, in a voyage to India or China and back, the whole consumption will not exceed the rate of about one gallon per man, and that in the class of ship in which scurvy is found most to prevail, the daily consumption does not exceed half-a-pint for all hands.

Before the lime-juice is bottled it is essential to ascertain its quality. By an experienced person good lime-juice is easily recognised by the simple tests of taste, smell, and specific gravity; in cases of doubt a chemical analysis would be desirable. The specific gravity of true natural juice is always higher than the imitations. Mr. Leach has paid much attention to this subject. The results of ten good specimens gave a density ranging from 1030 to 1040, and showed a dark residue on being evaporated to dryness. The specimens of reprehensible quality showed a specific gravity from 1021 to 1026, and yielded hardly any residue; allowance must of course be made for spirit should it be added before the hydrometer is used. The proportion of mucilage and other organic matter in lime-juice is considerable. In a recent analysis made by Mr. Witt for Dr. Bence Jones, one ounce was found to contain less than two grains of inorganic matter (accurately 1·728 grains). Three-fourths of this small amount consisted of potash, in combination with sulphuric and carbonic acids; the remaining quarter of a grain was composed of phosphoric acid with soda and lime, and traces of silica, iron, and magnesia; the rest is made up

of water and citric acid, of which there are forty grains in a fluid ounce.

Several years ago Dr. Garrod ascribed great importance to the presence of potash in lime-juice and other anti-scorbutics. He announced that the disease depended on a deficiency of potash in the blood; that the diets which cause scurvy contain less than the proportion of potash necessary to health, and that the administration of potash alone was sufficient either to cure or prevent the disease. Nitrate of potash has been reputed by some a good anti-scorbutic, but the experience of the Royal Navy, and especially of Dr. Bryson and others in charge of convict ships, has led to the conclusion that it is comparatively useless or inert, if not injurious. From the remarks of Dr. Barnes, also, the value of this salt seems to be extremely doubtful, and he quotes a remarkable instance of scurvy having broken out to a great extent among a party of lumberers in Canada who were fed on pork salted freely with nitre, and to this circumstance, indeed, Dr. Grant, who described the cases, mainly ascribed the outbreak in question.

I perceive that the Dreadnought Society, in their preventive recommendations, suggest, in the absence of lime-juice, that five grains of the bicarbonate of potash should be given twice a day.

It appears to be at least doubtful whether the anti-scorbutic property of lime-juice is due to the presence singly, either of the large proportion of citric acid, or of the infinitesimal quantity of potash contained in it. May it not rather be the combination of both with the *organic* constituents, in a manner so subtle as to elude our present chemical knowledge, which is essential to its prophylactic power? We know that *that* power is fleeting, and must, in a longer or shorter time, disappear; yet the potash, on which so much stress has been laid, is one of the least perishable of its constituents.

The regular and sufficient issue of lime-juice to the crew is of paramount consequence, yet in most merchant ships it is the exception rather than the rule. It should be left less to the discretion of the men themselves, but should become an integral part of the discipline of the ship. I consider it more judicious to serve out lemon-juice in small quantities daily, than in larger quantity once or twice a week. The crew should be taught to regard it as essential a part of their daily food as meat or biscuit. Allowing for the long oceanic voyages ships now make without touching for refreshment, I would recom-

mend that, in the latter part of the voyage, the issue should be increased to one ounce per man, with an equal quantity of sugar or molasses, and a pint of water. The mixture should be made before dinner and served out to the crew under the superintendence of an officer, so that it should be drunk at their meal; some who now neglect it might thus be induced to take it with regularity, and even enjoy it. Sea-faring men are capricious, and in some minds there is a prejudice against it. In some ships of war I have seen this met by mixing the allowances of grog and lemon-juice together—a mild form of compulsion which was found to be effectual. At present the Act requires the juice to be issued when a vessel has been ten days at sea; this period might in most instances be shortened with advantage. I would recommend it be given simultaneously with the salt provisions without any delay, and even with fresh meat when, as sometimes happens, no green or succulent vegetables accompany it. For many years, and in very different parts of the world, I have been able to carry this practice into effect, and with success, not only in obviating scurvy, but also in warding off other maladies from which, through want of a salutary variety of diet, sea-faring persons are prone to suffer; such are dyspepsia, diarrhœa, and dysentery; ulcers, night blindness, and idiopathic debility, all of which there is reason to believe partake of the scorbutic type in some degree, although the more prominent and characteristic symptoms of scurvy are absent.

A wholesome and varied food, with a due proportion of fresh vegetable matter, should always be procurable in harbour, and with a little pains and foresight at sea also. No single article of diet can be persisted in for a long time. It is well established that with a purely fresh meat diet scurvy may occur, and indeed must occur, if vegetables are altogether withheld. The history of military operations, both ancient and modern, are full of illustrations. Salt provisions are negatively injurious, from their monotony and from their inferior power of nutrition, yet seamen are proverbially fond of them, and even when on shore continue to prefer salt and dried fish, ham, bacon, cheese, and the like.

As the time between their voyages is very short (frequently not exceeding a few days), they rarely have the opportunity of enjoying a mixed natural diet for a sufficiently long time to counteract the ill effects of their usual regimen; there is, therefore, the greater need not only of giving a more liberal supply of lime-juice, but of satisfying their wants with pre-

served meats and vegetables, in as varied succession as practicable, and in taking care that in port, and for some time after leaving port, they have free access to such green vegetables and fruits as the country produces. Some of these, as potatoes, yams, bananas, oranges and limes, will keep for some time. Great carelessness, or rather I should say culpable apathy and indifference, exists on this point to a degree that is hardly credible. Notwithstanding the high perfection to which the art of preserving various kinds of meat and all sorts of vegetables has attained, and their comparatively cheap rate of production, they hardly ever find a place in a ship's dietary. The aliment provided by agreement for the seamen of our day is in no respect different (except perhaps in quality) from that which his forefathers had a century ago. Salt beef and salt pork, flour, peas and biscuit, are still the only description of food which, in the vast majority of ships, is tolerated or enjoined by relentless and unreasoning custom. It is true the quality of these articles is for the most part faultless; quite equal in the vessels I have inspected to those furnished to Her Majesty's ships; yet it seems worse than an oversight that such welcome and inexpensive luxuries as preserved potatoes and other common vegetables, pickles, condiments, and dried fruits, should be habitually denied to merchant seamen. The emigrant and the convict are cared for by legislative enactment, and the man-of-war's-man, besides being more frequently in port, and having sufficient means to purchase for himself, is placed under a parental despotism whose duty and pride it is to protect, at whatever cost, his health and vigour.

Instances frequently occur in the merchant service of vessels lying in tropical ports for weeks without any regular issue of vegetables, and that even while fresh meat is withheld. The idea of procuring a supply for all hands of fish or fruit is never entertained even when these constitute the cheap and natural fare of the inhabitants of the place. Unimproved by their sojourn in harbour, they again put to sea on their return voyage; the lime-juice, as usually packed, is deteriorated; the beef, also, often begins to spoil; the other provisions continue to be good. The vessel has rounded the Cape of Good Hope before even the weaker men are smitten with scurvy; some have had climatic diseases in India or China, and been shipped perhaps from an hospital; some have been suffering from venereal affections, contracted in our vile sea-ports, when they first began their voyage;

others are young and not inured to hardship, with frames feeble and undeveloped. Of such material are the first subjects of attack. The symptoms are obscure, general malaise and muscular debility, with so little apparent derangement of the health or alteration of aspect as to give rise to the suspicion of malingering. But even if unmistakeable signs of scurvy have been revealed, it too often happens that the vessel sights and runs past the Islands of St. Helena and Ascension without stopping. In this age of eager competition, such is the desire for quick passages and corresponding profit, that a ship master does not scruple to encounter the storms of the Bay of Biscay, and the intricate navigation of the channel with half his crew disabled by disease, and so he braves loss of life and cargo rather than brook the delay of a few hours and the expenditure of a few pounds, or it may be shillings, in procuring needful refreshments at those islands.

In corroboration of the well-known fact, authenticated in several of these inspections, that scurvy generally manifests itself in India ships about the time of doubling the Cape, I am informed through Mr. Leach that the admissions of very severe cases in the last five years into the St. Helena hospital, amount to no fewer than about thirty per annum, to say nothing of many more treated as out-patients, in whom the scorbutic symptoms were comparatively milder. The cases admitted were of such intensity that their average duration was thirty-five days, and they formed one-twelfth to one-fifteenth of the whole number of admissions into that institution.

Much stress has been laid, and no doubt justly, on the circumstance that the disease is unknown among the officers of the merchant navy; I have found in my experience some instances to the contrary. In that class of vessel, in which scurvy is most frequently met, and which seldom carry passengers, the ordinary daily fare of the officers differs but little, if at all, from that of the men. They probably take care to secure a few pickles and preserves, besides laying in some fresh fruit and vegetables before leaving harbour. But their immunity, I apprehend, is mainly owing to the habitual, although moderate use of stimulants, more especially in the fermented form, sometimes light wine, but chiefly bitter beer and porter.

The value of these as antiscorbutics was perfectly well known in the last century. Both wine and beer were at one time issued in the navy when practicable, as a regular

ration, and the medical officers of that time, who were keen and accurate observers, and were in truth the very founders of hygienic science, furnish ample evidence of their efficacy. The superiority in health of the great fleets which France sent forth in those days was often to be traced to their never having abandoned the use of fresh bread and of wine.

Lime-juice has practically superseded all other beverages for purely medicinal purposes, but it is a question how far a partial return to the occasional issue of beer or wine might not be advantageous. In very few merchant ships are spirits now allowed; tea and coffee are given, but they are too often of indifferent quality, and badly prepared. A wholesome weak alcoholic drink would hardly fail to be acceptable, and there is reason to believe would be beneficial to health.

I have seen in the Royal Navy good effects from the permitted purchase, under proper restrictions, of small quantities of bottled bitter beer. In operations of war in blockading an enemy's coast, our supplies of fresh provisions from the shore were sometimes cut off for long periods, and a slight indulgence of this sort was most welcome to our seamen. In the United States' Navy there was, and probably is, a practice of selling to the men at fixed and moderate prices a variety of little luxuries which, at choice, they might add to the standard dietary of the service. I think the practice by no means unreasonable, and some modification of it might be introduced with advantage into our merchant ships; even in the Royal Navy there is still, I believe, room for improvement in variety of food. Some years ago rations of preserved fresh meat were given twice or thrice a week, but through bad faith on the part of the contractors and other mismanagement the scheme failed. Much of the meat was no better than carrion, the seamen were disgusted, and, as some gentleman present may remember, public indignation was strongly roused. There seems no reason why the experiment should not in more favourable circumstances succeed. The preserved food furnished for our sick is of first-rate excellence, and is most liberally supplied at the discretion of the medical officers.

As anti-scorbutic articles of diet, the preserved vegetables would rank even higher than fish or meats. In the South Polar Expedition of 1844-45, of which I had medical charge, they were issued to the crew with great advantage, so also were pickles, and the dried American apples and peaches, on which the United States whalers set such store

in their prolonged and adventurous voyagings. Treacle is an anti-scorbutic of considerable value; it is much used by our transatlantic brethren, and very judiciously, in cooking pork. Mustard should be, as in the Royal Navy, a constant article of ships' diet. Vinegar, although an agreeable condiment, has no marked anti-scorbutic virtue; it, however, holds a prominent place in the Merchant Seamen's Act. It is ordered to be issued at the rate of half a pint per week for each individual. Vinegar and lime-juice form the only articles of diet secured by law to the merchant marine; all other articles of provision are simply a matter of agreement and private contract. I have had the opportunity of examining the printed articles of agreement of various sizes and classes of ships, but in the kind and quality of food there is little or no difference. Good water is indispensable to health; its direct bearing on scurvy, however, is not very marked. The Seamen's Hospital Society in their printed recommendations remark, that water obtained from a condensing apparatus is much inferior to fresh water, and chiefly from its deficiency in certain salts. I am here inclined to differ. No water can, in my opinion, be purer or in every way more wholesome than that properly distilled, provided it be exposed for a short time to the air and kept in perfectly clean iron tanks. It was only at the last meeting of this Society that I adduced some striking facts as to the value of condensed water as compared with the water of tidal rivers. I mentioned the singular exemption from cholera of ships which used distilled water when that disease was prevailing around them, and the circumstance that even while the disease had been imported from the shore it was not propagated or extended. But this is a digression. I can only repeat that, even if the anti-scorbutic properties of distilled water be feebler (and this to me appears doubtful), such loss is amply compensated for by its being far less likely to affect the bowels than the water generally procured by ships from the great rivers of India and China, even when, as is usual, that water has undergone some process of filtration.

Personal cleanliness is, I conceive, of considerable importance as a partial antidote to scurvy. Merchant seamen are sometimes inconceivably dirty, apathetic and indolent; they thereby sooner fall victims to this disease, more especially when, in their return voyage from the tropics, they come suddenly into the low temperature of our northern winter. Their vital energies are depressed to an alarming

or even fatal degree. Cases of this kind have come under my notice in the inspection of vessels which arrived in London in the last two winters.

In cold weather warm water should be allowed for washing. The crew should also be encouraged in exercise, games, or other amusements to beguile the time, as well as counteract the torpor induced by a tedious voyage, and what is to them an excessive degree of cold. The clothing of the men is often insufficient for the vicissitudes of climate which they have to undergo in rounding the Capes Horn and Good Hope, or in arriving in the European seas. Many of those who have embarked as new members of the crew at tropical ports, are utterly destitute of suitable warm clothing; there is no doubt that this defect gives freer access to the inroad and aggravation of scorbutic disease. Overcrowding and bad ventilation would no doubt be a powerful predisposing agent in the causation of scurvy, as has been amply proved by many examples in convict and emigrant and troop ships, and, to go back to an older time, in the Royal Navy. In few of the merchant ships of which I have had cognizance is any fault to be found on this score. The wretched old top-gallant forecastles, where those not on watch used to be huddled together like the lower animals, are now superseded in most instances that have come before me, by spacious deck-houses well lighted and well aired, and yielding better accommodation to their occupants than is to be found in many of Her Majesty's ships.*

The subject of discipline is foreign to our discussions in this Society, yet it is by no means irrelevant to the present question. I may be permitted to observe that considerable allowance must be made for the difficult position of the officers of the Merchant Navy. The crews of the lower class ships are now composed of the most heterogeneous materials, including foreigners of every nation; they are often turbulent and intractable, and the reins by which they are held to duty are slack. The efforts of commanders to maintain order are not always successful; their treatment of the men is sometimes capricious, if not harsh, and occasionally degenerates into heartless indifference. With regard to the discrimination of disease, they must experience much difficulty, when, as in all smaller vessels, they are left to their own resources.

* Some vessels which I have recently inspected for the Board of Trade had exceedingly defective accommodation between decks for the crew. They were chiefly in the West Indian and fruit trade and no scorbutic cases occurred in them.

It is obvious that with a medical officer there is little likelihood of cases of scurvy being overlooked, even when by some ill chance they should have been permitted to occur. But several instances have come to my knowledge where the master has been treating men for rheumatism, or secondary syphilis, or climatic cachexy, and has been astonished to learn that when admitted to the *Dreadnought* they were indubitably suffering from sea scurvy. It may even happen that, with the best intentions he may, by mercurial or other injudicious, hap-hazard treatment, have done them grievous injury. The disease is slowly progressive, and the diagnosis is often difficult to an unprofessional person. Hæmorrhages, and even the spongy gums and black legs which are so characteristic, are long in making their appearance; and in the absence of such patent indications, the vague muscular pains and unaccountable languor, not accompanied by fever or emaciation or loss of appetite, are symptoms too often regarded with suspicion or contempt. Singularly enough, the scorbutic *ulcer*, of which in the systematic writers we hear so much, is at present very rarely seen even in the worst cases.

The more experienced or shrewder captains may treat the cases as scurvy from the beginning, but the means at their disposal are very limited. The muddy remains of the lime-juice are inert, and are given in double doses to no purpose. Citric acid or the nitrate of potash with vinegar are the other remedies in vogue. Purgatives and Dover's powder appear also to be largely used. Beer and pickles are sent from the cabin, but at this period of the voyage the stores there are already low or exhausted; the opportunity of replenishing them at the Cape or St. Helena has been neglected, and little can be afforded. Details of the treatment of each case are recorded, as required by law, in the official log book.

The results are not encouraging, and when the ship, delayed perhaps by baffling winds, arrives in the Thames, the unhappy patients are often in a most deplorable plight, and have to be hoisted on board the *Dreadnought* in a state of extreme prostration, unable, from the state of their mouths, to take any but soft or liquid food. Death sometimes ensues —its mode being by syncope, after some slight exertion. The greatest care is therefore taken to keep the patients tranquil. Another sad result occasionally seen is irremediable; stiffness and contraction of the joints. But as a rule the simple treatment employed operates as a charm, and re-

stores the sufferer in a few days or weeks to such enjoyment of life as he has long been a stranger to. The decks of the *Dreadnought* are regarded as a very paradise by those rescued wayfarers. Perfect recovery, however, is not a uniform consequence. Dr. Barnes, who on this subject speaks with the authority derived from an immense experience, has expressed his belief that "the physical deterioration of sailors from the modified starvation which culminates in scurvy is very great. The constitution that has once yielded to it is so far damaged that any latent predisposition to other disease, as to phthisis, is apt to acquire ascendancy and to hurry the victim to an untimely end. Of those who recover, many do so imperfectly."

The same axiom holds good with regard to the other great scourge of mariners (to which I called the attention of the Society two years ago), and which, to the disgrace of our civilisation, flourishes in rankest luxuriance in this port of London. We have seen how the syphilitic taint exposes to the attack of scurvy, and how, in the re-action, the blood-disease comes as an ally to strengthen the hold, both of syphilis and tuberculosis. The apostrophe of the poet is as true now as when it was written,—

> "Poor child of danger, nursling of the storm;
> Sad are the woes that wreck thy manly form!"

Actuated by humane and patriotic motives, the Seaman's Hospital Society have for some time fulfilled the important duty of reporting to the Board of Trade all such cases of scurvy as may be considered fairly referable to culpable neglect. For example, when two or more cases are received from a vessel with a crew not exceeding twenty men, the presumption is that the state of that vessel as to diet and other matters has been objectionable. On these representations the Board directs an inspection of the vessel and its various stores, and an inquiry into all the circumstances of the crew which may have led to such results. The master, officers, and crew are examined, as well as the patients on board the *Dreadnought*, and the entries in the log book concerning the sick are carefully scanned. The evidence is often very contradictory, ill feeling on both sides showing itself in discordant statements as to the simple facts. Sometimes the provisions and lime-juice are all consumed, and no opinion can be formed thereon. The crews are sometimes dispersed before the inspection can take place; thus, important links in the chain of evidence are sometimes wanting; yet the details of mismanagement elicited by these

inspections simply prove the necessity for them, and also for remedial measures of a preventive kind.

Six of these reports, with some others from the out-ports, were printed by order of the last parliament, and since then I have been again engaged on eight inquiries of similar character. In all these I had the valuable co-operation of Mr. Coleman, of the Registration of Seamen Office, who possesses an unrivalled knowledge and experience of the Merchant Shipping Act and its workings.

If time had permitted I would have placed some of these reports before the Society; but the facts, and the conclusions based on them, have been already discussed at considerable length. And we shall now come to the question as to how these crying evils shall be remedied. With all its admirable provisions, the Merchant Shipping Act of 1854 is defective; first, in not prescribing a dietary for seamen, of which fresh vegetables, or the best substitutes for them, should be positively enjoined as part; secondly, in not insisting that lime-juice should be served out *every day* on which fresh vegetables are not issued; and thirdly, in not providing that the lime-juice shall be ascertained to be of good quality, and supplied in such a form as to be reliable, for at least two years, as an anti-scorbutic.

The powers of the central government in this matter are at present limited. They can institute inquiries (such as these) to detect abuses, but not to prevent them. The local marine boards might, if they chose, cause inspections as to the quantity and quality of anti-scorbutics while being supplied before the voyage. The Board of Trade, recognising the great importance of *preventive* inspections, suggested the appointment of a medical officer for that purpose, at the ports of London, Liverpool, Dundee, Glasgow, Greenock, Hull, Newcastle, Shields, and Sunderland. But with the exception of London and Hull the replies of the local marine boards were decidedly unfavourable. The reasons they allege for being averse to such inspections are their disbelief in their necessity, the difficulty and even impracticability of carrying them out, and their tendency to interfere injuriously with the business of the port.

"Unless the inspection be general," writes the Sunderland Board, "it would be throwing a most invidious duty upon the Superintendent of the Mercantile Marine Office to authorise him to select cases for inspection, and the Board are unable to conceive the existence of circumstances which would (except in extreme cases) justify his doing so. It

would be sure to create great dissatisfaction, and might expose the superintendent to the suspicion of being actuated by personal antipathies. If, on the other hand, the inspection were general, the inconvenience would become so great, that it would be all but impracticable."

I may observe that it is mainly from these very ports that our scurvy-tainted ships do come. Out of fifty-five cases admitted into the *Dreadnought* from ships belonging to British ports, eight were from Sunderland alone.

Only three months ago I inspected a vessel which sailed from that port, in whose crew, of only nineteen in all, two deaths occurred in the Thames from scurvy, and four others were a long while in the hospital ship suffering dreadfully from that cruel disease. The lime-juice, the master stated, was procured at Sunderland and was issued regularly. Here is a specimen of it. It is nothing more than the solution of citric acid, slightly flavoured with lemon, to which I adverted a little while ago, and is I believe of little or no value as an anti-scorbutic. Another vessel (from Kurrachee) which I inspected, belonging to Stockton-on-Tees, furnished no less than eight cases—indeed, the whole crew were more more or less affected with scurvy, and those who had been hoisted on board the *Dreadnought* presented its most aggravated features. In this instance the lime-juice had been originally good, but from the faulty method of preservation had deteriorated. But it was distinctly adduced in evidence that it was irregularly taken, and that many of the crew systematically neglected it.

Another vessel which I inspected about a month ago, belonging to Liverpool, had a third of her crew disabled by scurvy, four of whom were for some time in the *Dreadnought*. Here the lime-juice was obtained from a native merchant at Calcutta, and soon spoiled, so as to be undrinkable. The disease broke out sooner than in most other cases. As no fewer than seven cases were then on the sick list, the ship called at Ascension and procured a supply of citric acid, but it failed either to relieve the sick or to prevent further extension of the malady. This is a specimen of the lime-juice, which will be found to be very offensive.

It is strange that facts like these do not carry conviction to the minds of the local authorities of our mercantile marine, and impel them to the course of action indicated by the Board of Trade.

In the absence of an official inspection, which would seem

to be the readiest and most efficacious way of meeting the case, various propositions have been entertained. As the owners and masters of ships appear to be unwilling to take the trouble to add the requisite spirit, and bottle off the lime-juice in such quantity as would insure its preservation, it seems to me desirable that licensed vendors should be required to do so; that the only form of supply should be in sealed small vessels of stone or glass; and that the sale should be accompanied by a certificate from the dealers, testifying to its purity and warranting it to keep. Respectable traders, receiving a fair price, would not decline a legal responsibility of this kind, and would, in self-defence, take greater care that the juice sold for consumption on long voyages should be of the best quality. This would do much to check the mal-practices of adulteration and manufacture which are now notoriously prevalent.

Another proposal (which seems practicable, at all events, in the larger ports), is the issue of the lime-juice to vessels only from *bond*, after being there tested and mixed with the proper amount of spirit. In this respect a slight saving would be effected, as the latter would be free from duty.

When the lime-juice is really good, and issued daily, and made into lemonade, little difficulty will, I think, be experienced in inducing the men to take it. Officers, however, should, as in the royal navy, show the good example of drinking it themselves. In the mercantile marine, those I have met with seldom or never take it; and thereby, I doubt not, unconsciously instil distrust of it into the minds of the younger hands. It is to be regretted that sounder notions on this branch of nautical hygiene should not find general acceptance. Those young officers are now, as a rule, well instructed in the science of their profession, and are often extremely able and intelligent men. Were they required to pass an examination of a simple character, on the subject of preserving the health of the crews they are destined to command, I believe a better *regime* would spring up in time, and some ideas now in vogue would become obsolete.

But, on the whole, it is to the owners rather than to the executive of the merchant navy, that we must chiefly look for corrective measures or for obstruction to them. It is obviously the interest of the captain to have his crew well fed and cared for, healthy and contented; for, without that, he cannot maintain the self-respect that is essential to discipline. But there is no doubt that, in many instances,

ship owners practise a too rigid economy; and that the hopes of the masters for employment and advancement, depend too much on the parsimony with which they can conduct their owners' business and enhance their profits. I am well aware that, by many shipping firms, much attention is paid to the health and comfort of their crews; and that scurvy is as much banished from their vessels as from Her Majesty's. But it is a matter of notoriety that, before the epoch of the Merchant Shipping Act, colossal fortunes were amassed through practices almost as flagitious as those we are in the habit of reprobating among slave-trading nations. Some of that leaven remains. To quote the expressive language of one most conversant with the subject, Dr. Barnes: —"The plight in which the poor sailors from certain services are admitted is pitiable to witness. Disabled by hardship, semi-starvation, and ill-usage of every kind, they are cast out with the same indifference with which a worn-out block would be thrown overboard. In such cases, owners and masters should be held personally liable in damages to the sailors whose health, their only possession, is injured. But, although they may have good grounds for an action at law for damages, sailors are not the kind of men to try a question of this nature for themselves."

For all parties the most eligible course would be found in state interference, and chiefly in the compulsion of preventive measures. £1 to £2 a-head in addition to the present usual supplies would procure, it is calculated, a scheme of diet resembling in variety that of emigrants, but considerably more abundant. Surely owners who desire to deal justly with servants, on whom their fortune so greatly depends, could hardly grudge such an outlay for a long oceanic voyage. Masters of ships are often strictly prohibited by their instructions from calling at the Cape of Good Hope and St. Helena on their return voyage. At the Cape at some seasons the weather in port is boisterous, and their insurance would be invalidated. But St. Helena is the most accessible of places at all times, and seems providentially designed for the refreshment of ships. Yet by almost every one of the vessels I have inspected, the island, although sighted, was passed by, and even when they were full of cases of scurvy.

We cannot wonder to find that the mortality in the mercantile marine is very great even as calculated on the present data, which are confessedly imperfect. My late friend and predecessor, Dr. McWilliam, estimated it from the records

of the Registration Office at about nineteen per thousand. But in truth it is considerably greater, for no account is there taken of the many hundreds who die unknown abroad, or who have to quit the service on account of disease contracted in it, and perish miserably at their own homes or in our civil hospitals and workhouses. It is admitted on all hands that a gradual but sure deterioration of this great body of men (about 250,000 in number) has been going on for some time, and gloomy prophets predict the possible extinction of the class. Certain it is that the adventurous youths of our country find a better vent for their energies in colonial enterprise and other pursuits, and we do not find either in the royal or merchant navy men of the same stamp as formerly. In the latter their place is supplied with thousands of foreigners, chiefly of the Scandinavian and German nations, who are attracted by the high rate of pay; they are considered by most masters I have seen as valuable acquisitions. Surely it is but just that these strangers, as well as our helpless fellow-countrymen, should not suffer from the cupidity of some of their employers, and so be discouraged from a service to which they are now essential.

I perceive that in a few days, viz., on the 12th of June, 1866, a motion will be made in the House of Commons for an address for a Royal Commission "to inquire into the present condition of merchant seamen with the view of ascertaining whether within the last thirty years the supply of British seamen has fallen off either in point of number or efficiency, and if in either a continuous decline should be apparent, then to ascertain further what are the causes which have led to such decline, and whether any remedy can be suggested."

I trust I have succeeded in my endeavour to exhibit one of the causes of this unsatisfactory state of things, and the obvious and easy remedies. Let us hope for speedy legislative action to amend the existing laws. Meanwhile, an expression of opinion from this Society on a matter of national importance cannot fail to give a valuable impetus to the movement. The recent enactments concerning the other great scourge of seamen—venereal diseases—are encouraging, and indicate a growing interest in parliament for sanitary questions. We may expect to see scurvy doomed to extinction at sea, as it long has been on land. May the time soon come when the miseries with which we are now too familiar shall be regarded as one of the curiosities of medical history; in the same light as we regard the terrible scorbutic epidemics

which slew whole armies, and which ravaged portions of the northern and central countries of Europe, from the time of the Crusaders to that of Frederick the Great, and of which we had recently a painful reminder in the Crimean war. Guided by the experience of that disastrous campaign (in elucidating which our distinguished ex-President, Dr. G. Milroy, had so great a share), we may reasonably infer that a similar calamity to the national force is not likely to recur. It is time that equal solicitude be shown for the welfare of those who constitute no small element of our naval force, and contribute so largely to the wealth and prosperity of the nation.

ON THE EPIDEMIOLOGY OF CAPE COLONY AND NATAL IN 1865.

By Deputy-Inspector-General LAWSON, M.D.

[*Read July 2nd*, 1866.]

ABSTRACT.

No epidemic of a severe and general nature prevailed during the year. At Cape Town there was a good deal of fever among the men, women, and children of the 10th Regiment, which had arrived from England in November and December 1864. This, in the opinion of the surgeon, was partly the result of insolation, with insufficient covering to the head; but the more serious cases assumed the form of typhoid fever, with the characteristic intestinal lesion. On investigation this was traced to the influence of the emanations from the men's and women's latrines, which are so situated, with regard to the rooms in which it prevailed, that the sea breeze could not reach these without carrying the emanations with it. The cases appeared chiefly in January, March, and April. Another fatal case, of the same form of disease, occurred in the same place in November, in the 9th, which had arrived from Gibraltar, and taken the place of the 10th at Cape Town. In several of the cases of fever at Cape Town severe pulmonic congestion came on, and materially accelerated the fatal termination.

Having referred to the reports left by the senior medical officers in this command, in order to ascertain the nature of, and circumstances attending the prevalence of fever at Cape Town in 1825 and 1827, there appeared every ground for the conclusions that it was mostly of the form now called typhoid, or pythogenic, as ulceration of the ileum was noted occasionally in the fatal cases, and perforation and peritonitis. Dr. Arthur, who was the principal medical officer, distinctly connected it with a foul state of the privies and ditches in the vicinity of the buildings in which it prevailed.

In the end of February 1865, there were a considerable number of cases of cholera of a pretty sharp character among

the civil population of Cape Town, though I am not aware of any deaths from it.

Varicella continued pretty common in Graham's Town, in January, among the children. It was prevalent about the Paarl, near Cape Town, in July, 1865.

Catarrhal affections, quinsy, diphtheria, and hooping cough continued more or less frequent in Kaffraria from the beginning of the year till April. In May influenza became prevalent over the eastern part of the Cape Colony, the Free State, and in Natal, running into bronchitis in many cases, and causing considerable mortality. This went on till August; about which time, or rather earlier, it extended to Cape Town. In October hooping cough again broke out at Graham's Town and the neighbourhood, and carried off a good many children in the course of that and the following month.

A very severe outbreak of pleuro-pneumonia took place among the horses in the districts of Beaufort, West Somerset, and Colesberg, in the Cape Colony, in the vicinity of Orange river, and in Bethulie, Calvinia, and Middleburg, the neighbouring portions of the Free State. This commenced in March, and ceased in April, on the accession of cold weather. It was estimated that six thousand horses died in that short period. The disease was also common at Natal about the same time.

Sheep in Natal suffered from what was denominated "blue tongue," about the same period.

In October and November there was great mortality among poultry over the eastern part of the Cape Colony and Kaffraria. They were described as being seized with cramp in the legs, and as dying in a few hours, with the comb and wattles becoming livid.

Rust attacked the crops sowed in 1865 also, but not quite so generally as in 1864. From September, onwards, there was a very prolonged drought, during which the country suffered very severely, so much so that fruit actually shrivelled on the trees. This unusual want of rain may have assisted in diminishing the prevalence of the rust.

ON THE CATTLE PLAGUE IN ITS EPIDEMIOLOGICAL ASPECTS.

By Dr. J. BURDON SANDERSON, F.R.S.

[*Read July 2nd*, 1866.]

In epidemiology practice is much more closely related to theory and more immediately affected by it than in practical medicine. It is of little importance as regards the treatment of intermittent fever, whether a man believes in the existence of an alkaloid resembling quinine as a constituent in the living organism or not. It makes no difference whatever to the question how we ought to treat cholera, whether we believe that cholera-collapse is dependent on spasm of the capillary ramifications of the pulmonary artery, or find as cogent reasons for adopting a contrary conclusion. We give alkalies in acute rheumatism (if we give them) not because the blood is less alkaline than it ought to be, but because we believe that these remedies relieve the patient; and so throughout, the practice of medicine is, after all, founded much more on empirical than theoretical reasoning. But in epidemiology it seems to be different. Inasmuch as we do not see the *result* of our preventive measures, and cannot judge of them empirically in the way we do of the utility of medicines, we are compelled to be guided simply by general principles, or, in other words, by theory. If Dr. Richardson is right in the views he promulgated two months ago in this room, in his belief that the fæcal discharges of the cholera patient constitute the only channel whereby the disease can be communicated from him to another individual, the practical application of his doctrine is plain. The immediate removal or destruction of alvine evacuations will be the one and only object of prophylaxis. These considerations enable us to understand how it happens that the art of preventing disease has always associated itself more closely with pathology than the art of curing it; and that it has been most advanced by those who have most closely followed the Harveian method of studying and searching out the secrets of nature by way of experiment.

The employment of the lower animals for the observation of the phenomena of disease and the investigation of its essential nature, has not received the attention from pathologists that it deserves, especially in this country. On the Continent it is somewhat different, for in France, Russia, and Germany there are well-organised schools of veterinary medicine, the professors of which are members of our own profession, and the pupils as well drilled in physiology and pathology as our own students. Still, even in those countries the value of the *experimentum in corpore vili* does not seem to have been appreciated in its relation to disease. The recent inquiry relating to cattle-plague has accomplished this good, if no other, that it has introduced this new method to the notice of pathologists—and especially of those who, like ourselves, have to deal with that part of the subject which is comprehended in the term pathogeny,—the origin of disease rather than its subsequent phenomena.

On many accounts disease may be more completely studied in animals than in man. For they can be readily subjected to any required conditions which are physically attainable, whether of time or circumstance, and can be kept free from the interferences of treatment. In the investigation of a disease like cattle-plague, which may be communicated at will, either by inoculation or exposure, these advantages are specially felt, for it affords the observer an immense facility to be able to prepare his experiment at his own convenience and discretion. More particularly is this applicable to the question of the *origin* of this disease—that is, to the investigation of the *earliest effects* by which the morbid poison once introduced declares itself; for nothing is more conducive to the exactitude with which these effects can be estimated and understood than to have had the opportunity of testing every function during the state of health. When the condition of each physiological apparatus—circulatory, respiratory, digestive—has been previously gauged, it is comparatively easy to notice deviations so slight that they would otherwise have been overlooked. And, on the other hand, how vague, from the want of such an opportunity, is our knowledge of the earliest manifestations even of the most familiar infectious diseases, and how much is set down to the period of latency or incubation, which really belongs to disease. For it is not until interruption of health takes place that disease is supposed to begin.

In diseases which follow a definite course—as is the case with all infectious or toxæmic diseases, as a rule—it is no

less important to study the order of succession of the symptoms, or, as it is called, the development of the disease, than its origin. And here, again, it is infinitely easier to do so in animals than in man; the value of the result depending mainly on the patience and time of the observer. Having in in his first observations gained a rough knowledge of the principal events by which the progress of the malady is marked and distinguished, and fixed his attention on those which appear to him to be most important and characteristic, he is able, by the comparison of each succeeding case with its predecessors step by step, to correct and fill in his first outlines. As questions arise, and doubts are suggested to his mind, he can have recourse to nature herself for answers or solutions. And not only so, but he can so control and prepare the conditions of experiment, that she may be compelled to give them (so to speak) against her will. To his own faculty of observing, too, it is a great help to be able to watch for phenomena. There is no habit so difficult in clinical work as that of keeping the attention awake to the more minute signs of disease, bearing in mind that in nature nothing can be so trifling or transitory as to be unworthy of record. But the comparative pathologist, while watching the unfolding of a disease, is in a position somewhat similar to that of an astronomer waiting for a predicted event, the precise moment of which it is his object to determine. Conscious that results of great importance hang on the concentrated attention of a single second, he is able to apply his mind to his work with an intensity which would otherwise be unattainable.

And lastly, as regards the phenomena themselves. Every function can be investigated ten times as easily in the brute as in man. In man, pain, weariness, irritation of temper, or, as it is called, worry, and other purely psychical conditions, interfere both with the pulse and respiration. Bovine animals are never nervous or hysterical. The excretions can be measured and weighed, and the temperature can be determined, not merely in the mouth or the axilla, but in those cavities in which the readings of the thermometer are unaffected by the varying conditions of the atmosphere.

The investigation of cattle plague, carried out last winter under the auspices of the Royal Commission, related, as the Society is well aware, to a variety of questions which do not fall within the scope of epidemiology. I shall, therefore, refer to three only of the sections into which the scientific portion of the report is divided—that which concerns the relations between cattle plague and human disease, that on

disinfection, and my own report on the phenomena of cattle plague during life.

The question of the relation of cattle plague to human diseases was, as the Society are aware, confided to one of its most distinguished members, Dr. Murchison; who conclusively showed, by a comparison of the anatomical changes observed in cattle plague with those which occur in typhoid fever, that there is no resemblance between them; for, in the first place, the ulceration of Peyer's patches, resulting from the softening and sloughing of morbid deposit, is not present; while, on the other hand, the eruptions and intense catarrhal inflammation of the mucous membrane, which characterise cattle plague, are not seen in typhoid. Dr. Murchison further, as many present will remember, adduced a number of most striking facts in support of the identity between small-pox and cattle plague—so striking, indeed, as to carry conviction to the minds of many of the most cautious and thoughtful pathologists of the day. From this very fact it derives additional value; for even now, in reviewing Dr. Murchison's arguments, we can hardly help yielding to them, although we know that his conclusions have been contradicted by experience. The result will, it is to be hoped, serve, too, to disabuse the medical mind of the notion which seemed to prevail so generally last winter, that every bestial disease must, of necessity, have its human analogue—a doctrine for which I am unable to discover the slightest foundation.

In that part of the inquiry confided to myself, which related to the propagation of cattle-plague, the questions which I proposed to myself at the outset were the following:—

I. To what species of animals can the disease be transmitted either by inoculation or natural infection?

II. What are the conditions under which the disease can be transmitted from one bovine animal to another through the air?

III. In what way and to what degree (if any) are the effects of inoculation modified or mitigated, either by the mode of operating, by the number of insertions, or by the nature of the virus employed? Is there reason to hope that a virus may be obtained capable of producing a curable modification of the disease, whether (*a*) by diluting the virulent fluid with innocuous fluids, or by mixing it with antidotes; (*b*) by transmitting the morbid poison through animals of another species; (*c*) by selecting as sources of virus, animals

in which the disease assumes a mild character, or (*d*) animals in the earliest stages of the disease?

IV. In what parts of the diseased organism does the virus exist? Is it confined to the morbid secretions, or are all the tissues and animal fluids virulent? and if so, are they virulent in equal degree?

Of these four sets of questions the first three were answered tolerably satisfactorily. It was conclusively enough shewn, either from experimental or other facts, that the disease could be communicated to all ruminant animals, though with much greater difficulty to sheep, deer, and goats, than to the bovine species, and that it could not be communicated in any form to man. It was shewn that the disease could be transmitted through the air to distances of a few yards, under circumstances which precluded the possibility of any other mode of convection of virus; but that at greater distances the disease could only be conveyed by some form of indirect contagion. And finally, that no mitigation of the violence of the disease was observable whatever method of inoculation was practised.

The fourth question—that which relates to the seat of the morbid poison, to its distribution in the tissues and fluids, and to its properties, has also been partially answered, but so partially that the results lose their value by their incoherence and incompleteness. As, however, they involve the gist of the whole matter, I propose to occupy the remainder of this paper in considering them, and in endeavouring, so far as possible, to place the Society in possession of their present bearing.

In my own report I have refrained from formulising my conclusions. As, however, this has been ably done by the scientific members of the Committee, I will venture to adopt their words.

After stating that the earliest sign by which the disease is indicated is the rise of temperature; that this occurs about fifty hours after an animal has taken the disease by inoculation, and consequently at a time when it appears to be in no way ill, and that it is not until the fourth day that any symptoms manifest themselves sufficiently obvious to attract the attention of ordinary observers; and then describing in succession the stages through which the disease rapidly progresses towards its fatal termination, they go on to say: "The causes leading to these symptoms, or in other words, the reasons why these alterations from health occur may be thus stated. A peculiar agent causes first of all a morbid

state of the blood. Coincident with the first elevation of temperature, and of course long before there is the least outward appearance of ill health, the blood of an animal which has taken the cattle-plague contains an agent which can produce the plague in another animal. In other words, the earliest fact which can be made out after infection is that the blood contains the poison of the disease; so that serum obtained from it will give the disease by inoculation. This fact, ascertained by Dr. Sanderson, is the most important pathological discovery yet made in cattle-plague: it is pregnant with consequences in medical doctrine; for though the existence of a similar fact has been long suspected in several human diseases, it has never been proved in any. ..... How soon after the poison is put into the blood the animal becomes capable of giving the disease by natural infection to other animals is not determined, possibly not until those parts of the body which can give off products to the air become impregnated with the poison. At what time the blood and textures cease to be able to give the disease is also not determined; nor, when the poison, mixed with mucus or with serum, is exposed to the air, can a definite time be named when its energy is destroyed."

To determine these and other questions of a like nature, further experiments are necessary. I venture to add that they ought still to be made, for the present epizootic affords more favourable opportunities than have before presented themselves for the purpose. The disease has now become familiar to us in all its aspects; its origin and development have been thoroughly investigated, and the most certain modes of communicating it are known, so that we are in a most favourable position for further investigation in any direction. It is a disease which is particularly suited for the study of the virulent principle itself, for, from the extreme rapidity with which it multiplies in the organism, it appears to be of great activity.

It cannot be denied that the present epizootic ought not, if possible, to be allowed to pass without placing our knowledge of morbid poisons at least a few steps further, for it is more than probable that all morbid poisons belong to the same genus, and that if we could get hold even of one of them in a ponderable form, we should soon be enabled to seize on others. The conviction seems irresistible that no great progress can be made in epidemiology, till some attempt is made to substitute facts for the useless speculations which are now current as to the nature of virus in

general. For these reasons, although I doubt not that to most persons the subject appears sterile and uninteresting, I should not hesitate to enter on a new inquiry if I had the opportunity; and in that case the questions I should propose to myself would be the following:—

1. The virus of cattle-plague certainly exists throughout the whole mass of the blood, and in all probability throughout the tissues. By diffusion experiments it has also been ascertained that in the serum it is associated with the colloid as distinguished from the crystallisable constituents of that liquid. This inconsiderable step towards separation of the virus is the only one which has as yet been taken. Experiments ought without doubt to be made which would have for their object to pursue the analysis of the virulent fluid according to the chemical immediate principles which it contains. By the separation and physiological testing of each constituent, with reference to its virulence or infective power, the experimenter would hope to ascertain with what principle or principles the virulent property is associated. Even if this point were gained, it is scarcely necessary to point out that the *materies morbi* would not be isolated. In endeavouring to accomplish this final object, we should be very much in the dark, for its reactions are wholly unknown. We should necessarily be guided in investigation more by speculation than by induction, and of course should endeavour to follow those speculations which appear most probable. Thus, for example, one of the most learned and ingenious of our members has propounded a theory, according to which all *morbid poisons* are uncrystallisable alkaloids, forming crystalline salt with acids. If this hypothesis should turn out to be correct, we might hope to be able to separate these bodies by processes analogous to those used for the separation of the vegetable alkaloids.

Supposing that all attempts to separate the virus of cattle-plague were to turn out futile, much might still be done to determine its relations to physical and chemical agents.

Thus, Professor Thiersch, of Munich, found by his very numerous experiments on the effects of cholera evacuations when administered by the mouth to animals, that, while no effect whatever was produced by fresh intestinal liquid, constant toxic effects followed the administration even of the smallest conceivable quantity of the liquid, after it had been kept for three or four days and dried. From the remarkable results of these experiments he derived two important con-

clusions, viz., first, that cholera poison is not volatile (for *dried* material only was used); and secondly, that, to use his expression, "Der cholera-kranke liefert kein reifes Kontagium,"—that in order to the cholera material becoming *active*, it must be *kept* until some molecular change has taken place in it! If these things are true of cholera, they also may be true of cattle-plague.

Again, according to some pathologists, the living blood affords the sole condition necessary to the multiplication of virus, while, according to others, it is dependent on changes in the inoculated part.

And lastly, my own experiments have shown, as above-stated, that the whole mass of the blood may be virulent fifty hours after inoculation. Experiments are needed to determine the earliest moment.

Before concluding I should wish to draw the attention of the Society to the very interesting results contained in Mr. Crookes' report on disinfection, as bearing on the very question under consideration. Mr. Crookes found that a virulent fluid could be obtained by a variety of methods, all of which consisted essentially in aspiring (*i.e.* sucking mechanically) through tubes containing cotton wool, the air of sheds in which diseased animals were kept. By inoculating with this liquid the disease could be communicated. Mr. Crookes' results showing the power of carbolic acid in protecting animals from infection are also most remarkable.

MEMOIR OF BENJAMIN GUY BABINGTON, M.D., F.R.S., ETC.

By GAVIN MILROY, M.D., F.R.C.P., PRESIDENT.

THE subject of this brief memoir was a son of Dr. William Babington, long one of the most successful physicians in the metropolis, and who for many years was on the staff of Guy's Hospital as physician, and lecturer on chemistry and the practice of medicine. No member of the profession was more esteemed during life, or more regretted on his death in 1833 (from influenza, then so prevalent), than this truly good man, the leading features of whose character are well pourtrayed in a sketch of his career drawn up by his distinguished son-in-law, Dr. Richard Bright, in the twelfth volume of the *Medical Gazette*. The rare honour of his statue—one of the best works of the late Mr. Behnes—being admitted, in companionship with that of his friend and colleague, Sir Astley Cooper, into St. Paul's Cathedral, attests the universal respect and admiration for his memory. The shrewd and benevolent features of the worthy veteran are most faithfully and admirably expressed in the bust, a copy of which now adorns the library of the College of Physicians.

Benjamin Guy Babington, one of several sons, was born in 1794, and was educated at the Charterhouse, then, as now, one of the best schools for classical instruction in the kingdom. In early life he entered the Royal Navy as midshipman, and served, together with the present Lord Chancellor, Lord Chelmsford, in that capacity, at Copenhagen, and also at Walcheren in 1809. But he soon gave up that career, and entered at Haileybury College, whence, after going through the usual two years' curriculum, he proceeded in 1812 to India, having obtained an appointment in the Civil Service of the Company in the Madras Presidency. From early youth he had an extraordinary aptitude for acquiring languages. This talent he turned to good account in India, where he soon became an accomplished Oriental scholar; and, before he had completed his

twentieth year, he published the first grammar of the Tamul that had ever been printed. His knowledge of eastern languages he retained throughout life, and, on several occasions, he displayed remarkable skill in deciphering documents in the different dialects of India.

After seven or eight years spent there, his constitution began to suffer so much from the climate that he was compelled to come to England, returning overland (not by the overland route of the present day), and availing himself of the opportunities thus afforded to visit Egypt, Syria, and several of the islands of the Greek Archipelago. Wherever he went, he was an indefatigable observer and recorder of what came within his ken. Among other matters, which engaged his attention on his journey, he made numerous inquiries into the subject of the plague, which at that time was never absent from some part or other in the Levant, and was continually giving rise to international disputes in respect of the quarantine which, while enforced by some European governments with great rigour, was more or less neglected by others, and occasioned serious obstruction in various ways to commercial and general intercourse. Dr. Babington's observations were referred to in an article which appeared in 1827 in the *Quarterly Review*, drawn up by the late Dr. Gooch at the instance, it was said, of Mr. Canning, then Secretary for Foreign Affairs, and which was thought at the time to settle the question. Having, soon after his return to England, determined to quit the Indian service, and to adopt his father's profession, he at once applied himself with all his accustomed earnestness to fit himself for the life of a physician in London. Guy's Hospital was of course the school to which he attached himself for the acquisition of practical knowledge, and he entered also at Pembroke College, Cambridge, where he took the degree of M.B. in 1825. In 1830, he proceeded to the full degree of M.D., and in the following year was elected a Fellow of the College of Physicians. He had now fairly started on his professional career as a metropolitan physician. It was not long before he distinguished himself by some original inquiries in the then infant science of organic chemistry, and especially by analyses (carried on in conjunction with Dr. Bostock) of the blood and urine in connection with diseases of the kidneys,—that most important branch of pathological research which his relative, Dr. Bright, had then taken up at Guy's Hospital, and of which he was destined to become the world-famous exponent. In a paper

contributed by Dr. Babington to vol. xvi of the *Medico-Chirurgical Transactions*, entitled, "Some considerations with respect to the Blood, founded on one or two very simple experiments on that fluid," he first made use of the expression "liquor sanguinis," to denote the residuum of the blood after the red corpuscles have become separated from the fluid part. This term still holds its ground in the vocabulary of physiology; but few are aware of its parentage. He also wrote the article on "Morbid Conditions of the Blood," in vol. i of Todd's *Cyclopædia*, published in 1835.

On the first appearance of epidemic cholera in this country in 1832, he devoted much attention to the investigation of the phenomena and pathology of that singular disease, of which he had heard so much when he was in India, and in whose progress, step by step, from the East till it reached our own shores, he had been deeply interested. He was the first in this country to describe the exanthem occasionally observed in the consecutive fever. It was the interest, doubtless, excited in respect of the cholera, that led him, in the course of the following year, to publish a translation, from the German, of Hecker's work on the black death and other epidemics of the middle ages. This was well received by the profession, and unquestionably gave an impulse to epidemiological inquiry among our countrymen. The enlarged edition of the work in 1844, one of the earliest of the publications of the Sydenham Society—of which, on its foundation in 1843 he was elected treasurer—made it still more extensively known and appreciated both at home and abroad.

Early in his medical career, he obtained the appointment of physician to the Charterhouse and to the Deaf and Dumb Asylum. By the death of Dr. Cholmely in 1837, a vacancy took place in the medical staff of Guy's Hospital, and Dr. Babington was elected one of the assistant physicians. His opponent on that occasion was Dr. Hodgkin, to whose indefatigable exertions and great pathological knowledge the hospital is mainly indebted for the admirable museum it now possesses, and whose memory will long be cherished as one of the most talented physicians and large-hearted philanthropists of his age. Nearly thirty years passed, and the two rivals closed their careers within a few days of each other; one in his quiet home in George Street, Hanover Square, and the other in an Arab house at Jaffa, while on his way to Jerusalem, whither he was going with Sir Moses Montefiore on one of those missions of love and mercy in which he so much delighted.

In 1840, Dr. Babington became full physician at Guy's, having Drs. Bright and Addison as colleagues, and he continued to discharge the duties with marked assiduity and earnestness down to 1855, when he resigned the office. The first series of the Guy's Hospital Reports contains some good contributions from his pen; two of these, viz., on epilepsy and on chorea, specially deserve mention as sound practical papers, well worthy of study. He pointed out with great judgment the power and value of arsenic in chorea, believing it to be "the most powerful remedy of all," when its effects are cautiously watched so as to prevent any injurious consequences on the system. About the same time he edited the translation, from the German, of Feuchtersleben's *Medical Psychology* for the Sydenham Society, of which he continued to be the treasurer for many years.

When in 1850, on the cessation of the second European visitation of cholera, the Epidemiological Society was first projected, the name of Babington was at once thought of as that of the most fit and efficient leader of the movement. And fortunate indeed was the choice; for all must now feel how much of whatever success may have attended the labours of the Society was due to him who so long presided over its meetings. Besides the thousand passing small acts of most useful aid in the carrying on of the continuous business of the association, he contributed not only several annual opening addresses, but also some valuable papers, as on "the cholera in the Black Sea and Baltic fleets in 1854," on "Rubeola Notha," on "the means of diminishing the prevalence of syphilis in civil life," etc. "His name," to quote the words of Sir Thomas Watson's address on resigning the presidency of the College of Physicians in the present year, "will live as the founder, and for many years in succession the president, of a Society which has for its end the elucidation of one of the most interesting, important, and obscure subjects of medical inquiry—the sources, constitution, and laws of epidemic diseases." In 1854 he formed one of the Medical Council which the late Lord Llanover—then Sir Benjamin Hall—called around him, when president of the General Board of Health, to aid in the investigation of the third epidemic of cholera which was then visiting this country; and in 1865 he was associated with the Government Commission on Contagious Diseases in the Army and Navy, and at the time of his death was busily occupied in framing an analysis of the mass of evidence which had been collected. The active and valuable assistance, too, which he

gave to the Committee on Small-pox and Vaccination of the Epidemiological Society in preparing their final report, printed by the House of Commons in 1853, and also to the Committee on Quarantine of the National Association in discussing and reporting on the voluminous evidence brought together from different countries, and contained in the papers which were afterwards published by the legislature, will be remembered by all those who were engaged with him in these labours.

Besides his contributions to the science of his profession, Dr. Babington made more than one useful addition to its art. To him we are indebted for the original invention of the laryngoscope, for a new hygrometer, for a curved stethoscope, and many other ingenious contrivances. Having, in addition to extraordinary physical activity which he had possessed throughout life and which he retained to within a few months of his decease, a remarkable facility of manipulation, there was scarcely any operation with the hand (and he was ambidexter) which he could not accomplish, and that well too. "Excelling," says Sir Thomas Watson, "in those things that require perfection of the senses—accuracy of eye, agility of limb, delicacy of touch—he was, in sportsman's phrase, a good shot, a skilful billiard player, and no mean modeller." Nor were the higher gifts of poetry and music unknown to him. An anonymous volume (printed in 1855), entitled, *Passing Thoughts in Sonnet Stanzas; with other poems, original and translated,* attests that graceful thought and sentiment were in him combined with easy versification, and great facility of translation from different languages, French, German, Italian, and Spanish. There is a remarkably good version of Bürger's famous lyric of Lenora; also a very spirited description of a sudden squall which he witnessed in the Indian Ocean, besides more than one beautiful tribute of affectionate sorrow on the death of near relatives, his wife and two brothers.

But it was by the attributes of the heart, even more than by the endowments of the head, that Dr. Babington won and kept the admiration of all who knew him. A uniform urbanity of manner; an affability to every one, springing obviously not so much from the refinement of polished social life, as from innate kindness and amenity of disposition; a cheerfulness, and even gaiety under all circumstances, whether things went cross or went smooth; the utter freedom from even the approach of egotism, and the never-failing readiness to acknowledge and encourage the merits of

others; the promptitude to join in any work brought to his notice, whether of scientific usefulness or of active charity and benevolence; the love of truth for truth's own sake, whereby his mind was always kept unbiassed by the mere influence of prevailing doctrines, and averse from extreme and dogmatic opinions on points of controversy; and last, not least, a deep serene faith in the truths of the Christian religion—these, I take it, were among the leading moral characteristics of him whom we have lost, and whose example it will do us all good to strive to imitate.

One who had known him long and well in all the intimacies, alike of domestic and of professional life, has recorded his estimate of his moral character in these truthful words. "Personally, Dr. Babington was universally beloved, for a more amiable and genial temper than he possessed could not be imagined. He was overflowing with fun and good humour, and his benevolence was carried to a fault. In common with his father, he had the most generous spirit. Every poor person received his commiseration. Like his father, he gave an immense amount of gratuitous advice, not at his own house ostentatiously, but by his kind visits to the needy. Like his father, he would remit fees if he discovered he had been impoverishing his patient. Although so large and unknown an amount of unrewarded advice is given by our profession, yet Dr. Babington's virtues in this respect were so remarkable that they formed a striking trait in his character; and his friends could, no doubt, show that he has failed to enrich himself by his benevolence, and too often, perhaps, through the niggardness of those whom he benefited. In this selfish world he deserves a memorial if it were for nothing else than his kindness of heart."*

"Multis ille bonis flebilis occidit,
Nulli flebilior quam mihi."

Dr. Babington died on April 8th, 1866, in his seventy-third year, from disease of the urinary organs, and was interred in the cemetery at Hanwell.

* Medical Times and Gazette, April 21, 1866.

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